

## **SAN JOSÉ/SANTA CLARA TREATMENT PLANT ADVISORY COMMITTEE**

CHUCK REED, CHAIR  
JOSE ESTEVES, MEMBER  
PAT KOLSTAD, MEMBER  
JAMIE MATTHEWS, MEMBER  
MADISON NGUYEN, MEMBER

CHUCK PAGE, MEMBER  
JOHN GATTO, MEMBER  
ALEX GURZA, MEMBER  
KANSEN CHU, MEMBER

### **AGENDA/TPAC**

**4:30 p.m.**

**November 13, 2014**

**Room 1734**

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**1. ROLL CALL**

**2. APPROVAL OF MINUTES**

A. October 09, 2014

**3. UNFINISHED BUSINESS/REQUEST FOR DEFERRALS**

**4. DIRECTOR'S REPORT (verbal)**

- A. **Directors Verbal Report**
- Monthly Progress Report

**5. AGREEMENTS/ACTION ITEMS**

A. Sanitary Sewer Flow Study Update

Staff Recommendation:

1. Accept the staff report regarding the attached Sanitary Sewer Flow Study and cross reference to the full Council on December 2, 2014; and
2. Recommend to the full Council approval of the proposed changes and policy recommendations for future updates to the revenue program for the San José-Santa Clara Regional Wastewater Facility.

**The proposed update on the Sanitary Sewer Flow Study is scheduled for Council consideration on December 2, 2014.**

B. Odor Control Strategy for Regional Wastewater Facility

Staff Recommendation: Approve the proposed odor control strategy at the San José-Santa Clara Regional Wastewater Facility

**The proposed odor control strategy at the San José-Santa Clara Regional Wastewater Facility is scheduled for Council consideration on December 2, 2014.**

C. Biosolids Transition Strategy Update

Staff Recommendation: Accept this staff report that provides an update on the Biosolids Transition Strategy for the San José-Santa Clara Regional Wastewater Facility.

**The proposed update on the Biosolids Transition Strategy is scheduled for Council consideration on December 2, 2014.**

D. Agreement with Vitol, Inc. for the Purchase of California Carbon Allowances

Staff Recommendation: Ratify City Council adoption of a resolution to authorize the City Manager to execute an agreement between the City of San José and Vitol, Inc. for the purchase of California Carbon Allowances for the San José - Santa Clara Regional Wastewater Facility as part of the California Cap-and-Trade Program for an amount not to exceed \$306,605.25.

**The proposed agreement with Vitol was heard and approved by Council on October 28, 2014.**

6. **OTHER BUSINESS/CORRESPONDENCE**

7. **STATUS OF ITEMS PREVIOUSLY RECOMMENDED FOR APPROVAL BY TPAC**

A. Approve master agreements between the City of San José and the following firms for special inspection and materials testing services for various capital improvement projects at the San José-Santa Clara Regional Wastewater Facility for a 5-year term beginning upon execution of the agreements through December 31, 2019, subject to the appropriation of funds:

1. Construction Testing Services, Inc. in an amount not to exceed \$500,000; and
2. Signet Testing Laboratories, Inc. in an amount not to exceed \$500,000

**The proposed master agreements were approved by Council on October 21, 2014.**

B. Adopt a resolution authorizing the City Attorney to do the following:

1. Negotiate and execute a legal services contract with Hawkins, Delafield & Wood LLP to support the San José-Santa Clara Regional Wastewater

Facility capital improvement program for an initial one-year term with compensation not to exceed \$180,000.00; and

2. Exercise up to two one-year options extending the legal services contract with Hawkins, Delafield & Wood LLP with compensation for each option year not to exceed \$160,000 plus any funds remaining from the previous contract year, subject to appropriation of funds by the City Council.

**The proposed resolution for authority to negotiate and execute a legal services contract with Hawkins, Delafield & Wood LLP was approved by Council on October 21, 2014.**

- C. Accept this status report on the reissuance of the San José-Santa Clara Regional Wastewater Facility Discharge Permit and update on the health of the South San Francisco Bay.

**The status report on the reissuance of the San José-Santa Clara Regional Wastewater Facility Discharge Permit and update on the health of the South San Francisco Bay was approved by Council on October 28, 2014.**

- D. San José-Santa Clara Regional Wastewater Facility Semi Annual Capital Improvement Program Semi Annual Status Report January-June 2014.

**The San José-Santa Clara Regional Wastewater Facility Semi Annual Capital Improvement Program Semi Annual Status Report January-June 2014 was approved by Council on October 28, 2014.**

## 8. REPORTS

- A. Open Purchase Orders Greater Than \$100,000 (including Service Orders)

The attached monthly Procurement and Contract Activity Report summarizes the purchase and contracting of goods with an estimated value between \$100,000 and \$1.08 million and of services between \$100,000 and \$270,000.

## 9. MISCELLANEOUS

- A. There will be a Special TPAC meeting on November 20, 2014 at 4:00pm, City Hall, Room 1734.
- B. The next TPAC meeting is December 11, 2014, at 4:30 p.m. City Hall, Room 1734.

## 10. OPEN FORUM

## 11. ADJOURNMENT



NOTE: If you have any changes or questions, please contact Adriana Márquez, Environmental Services, (408) 975-2547.

To request an accommodation or alternative format for City-sponsored meetings, events or printed materials, please contact Adriana Márquez (408) 975-2547 or (408) 294-9337 (TTY) as soon as possible, but at least three business days before the meeting/event.

**Availability of Public Records.** All public records relating to an open session item on this agenda, which are not exempt from disclosure pursuant to the California Public Records Act, that are distributed to a majority of the legislative body will be available for public inspection at San Jose City Hall, 200 East Santa Clara Street, 10<sup>th</sup> Floor, Environmental Services at the same time that the public records are distributed or made available to the legislative body.



**MINUTES OF THE  
SAN JOSE/SANTA CLARA  
TREATMENT PLANT ADVISORY COMMITTEE**  
City Hall, City Manager's Office, 17<sup>th</sup> Floor, Room 1734  
Thursday, October 09, 2014 at 4:30 p.m.

**1. ROLL CALL**

Minutes of the Treatment Plant Advisory Committee convened this date at 4:30 p.m. Roll call was taken, with the following members in attendance:

Committee members: Committee Chair Chuck Reed, Committee Members, Jose Esteves, John Gatto, Pat Kolstad , Alex Gurza, Jaime Matthews, and Chuck Page

Absent: Kansen Chu, Madison Nguyen

**2. APPROVAL OF MINUTES**

- A. September 11, 2014  
**Item 2.A was approved.**  
Ayes - 6  
Nays - 0  
Absent - 3

**3. UNFINISHED BUSINESS/REQUEST FOR DEFERRALS**

**4. DIRECTORS REPORT**

- A. Directors Verbal Report:
- Monthly Progress Report
  - Supplemental Memorandum
- Approval of the use of the design-build project delivery method for the cogeneration facility project at the San Jose-Santa Clara Regional Wastewater Facility

**5. AGREEMENTS/ACTION ITEMS**

- A. Approve master agreements between the City of San José and the following firms for special inspection and materials testing services for various capital improvement projects at the San José-Santa Clara Regional Wastewater Facility for a 5-year term beginning upon execution of the agreements through December 31, 2019, subject to the appropriation of funds:
1. Construction Testing Services, Inc. in an amount not to exceed \$500,000; and
  2. Signet Testing Laboratories, Inc. in an amount not to exceed \$500,000

**The proposed master agreements are scheduled for Council consideration on October 28, 2014.**

**Motion by Committee Member Matthews, second by Committee Member Page to approve items 5.A., 5.B and 5.D.**

**Ayes – 7**

**Nays – 0**

**Absent - 2**

**B. Adopt a resolution authorizing the City Attorney to do the following:**

1. Negotiate and execute a legal services contract with Hawkins, Delafield & Wood LLP to support the San José-Santa Clara Regional Wastewater Facility capital improvement program for an initial one-year term with compensation not to exceed \$180,000.00; and
2. Exercise up to two one-year options extending the legal services contract with Hawkins, Delafield & Wood LLP with compensation for each option year not to exceed \$160,000 plus any funds remaining from the previous contract year, subject to appropriation of funds by the City Council.

**The proposed resolution for authority to negotiate and execute a legal services contract with Hawkins, Delafield & Wood LLP is scheduled for Council consideration on October 28, 2014.**

**Motion by Committee Member Matthews, second by Committee Member Page to approve items 5.A., 5.B and 5.D.**

**Ayes – 7**

**Nays – 0**

**Absent - 2**

**C. Accept this status report on the reissuance of the San José-Santa Clara Regional Wastewater Facility Discharge Permit and update on the health of the South San Francisco Bay.**

**The status report on the reissuance of the San José-Santa Clara Regional Wastewater Facility Discharge Permit and update on the health of the South San Francisco Bay is scheduled for Council consideration on October 28, 2014.**

**Motion by Committee Member Gatto, second by Committee Member Page to approve item 5.C.**

**Ayes - 7**

**Nays – 0**

**Absent – 2**

David Wall, Public, spoke on this item.

- D. San José-Santa Clara Regional Wastewater Facility Semi Annual Capital Improvement Program Semi Annual Status Report January-June 2014.

**The San José-Santa Clara Regional Wastewater Facility Semi Annual Capital Improvement Program Semi Annual Status Report January-June 2014 is scheduled for Council consideration on October 28, 2014.**

**Motion by Committee Member Matthews, second by Committee Member Page to approve items 5.A., 5.B and 5.D.**

**Ayes – 7**

**Nays – 0**

**Absent - 2**

6. **OTHER BUSINESS/CORRESPONDENCE**

7. **STATUS OF ITEMS PREVIOUSLY RECOMMENDED FOR APPROVAL BY TPAC**

- A. Proposed Ordinance to Amend the Sewer Use Regulations

Staff Recommendation: Approve an ordinance amending Chapter 15.14 of Title 15 of the San Jose Municipal Code to add a new Section 15.14.248 and amend Section 15.14.755 to add a new definition of the Clean Water Act and modify permit conditions to allow the transfer of discharge permits in the event of a change of ownership.

**The Proposed Ordinance to Amend the Sewer Use Regulations was approved by Council on September 16, 2014.**

David Wall, Public, spoke on this item.

- B. Approval of Citywide Insurance Renewals and Related Appropriation Ordinance Amendments in the Convention and Cultural Affairs Fund

Staff Recommendation:

- (a) Adopt a resolution authorizing the City Manager to select and purchase certain City property and liability insurance policies for the period October 1, 2014 to October 1, 2015, at a total cost not to exceed \$1,700,000 for all policies, with the following insurance carriers, subject to the appropriation of funds:
- (1) Lexington Insurance Company, Boston, MA for Property Insurance, including Boiler & Machinery.
  - (2) QBE Insurance for Airport Owners and Operators Liability including War Risks & Extended Perils Coverage (Primary and Excess) and Police Aircraft Hull & Liability including War Risks & Extended Perils
  - (3) Travelers - or other insurers that the City is currently in negotiations with - for Automobile Liability (Airport fleet vehicles including Shuttle Buses,



Regional Wastewater Facility fleet vehicles, and Airport Shuttle Bus physical damage.

- (4) Indian Harbor Insurance Company for Secondary Employment Law Enforcement Professional Liability.

(b) Adopt the following 2014-2015 Appropriation Ordinance amendments in the Convention and Cultural Affairs Fund:

- (1) Increase the Insurance Expenses appropriation to the Finance Department for Insurance Expenses by \$11,000; and  
(2) Decrease the Ending Fund Balance by \$11,000.

**The Approval of Citywide Insurance Renewals and Related Appropriation Ordinance Amendments in the Convention and Cultural Affairs Fund was approved by Council on September 23, 2014.**

- C. Approval of the Use of the Design Build Project Delivery Method for the Cogeneration Facility Project at the San Jose–Santa Clara Regional Wastewater Facility

Staff Recommendation: Adopt a resolution approving the use of the design-build project delivery method in accordance with California Public Contract Code Section 20193 for the construction of the Cogeneration Facility Project, which is estimated to cost in excess of \$2,500,000.

**The Approval of the Use of the Design Build Project Delivery Method for the Cogeneration Facility Project at the San Jose–Santa Clara Regional Wastewater Facility was approved by Council on October 7, 2014.**

## 8. REPORTS

- A. Open Purchase Orders Greater Than \$100,000 (including Service Orders)

**The attached monthly Procurement and Contract Activity Report summarizes the purchase and contracting of goods with an estimated value between \$100,000 and \$1.08 million and of services between \$100,000 and \$270,000.**

**Item 8.A was approved to note and file.**

## 9. MISCELLANEOUS

- A. The next TPAC meeting is November 13, 2014, at 4:30 p.m. City Hall, 1734  
B. A Special TPAC Study Session on CIP Financing is scheduled for November 13, 2014, at 3:30 p.m. City Hall, 1734, prior to the regular TPAC meeting at 4:30 p.m.  
C. A Special TPAC Study Session on Biosolids is scheduled for November 20, 2014 at 4:00 p.m. in City Hall Wing Committee Rooms 118-120

**10. PUBLIC COMMENT**

David Wall spoke about the status of the PRA for South Bay Water Recycling.

**11. ADJOURNMENT**

A. The Treatment Plant Advisory Committee adjourned at 4:50 p.m.

Chuck Reed, Chair  
Treatment Plant Advisory Committee

For Procurement and Contract Activity between \$100,000 and \$1.08 Million for Goods and \$100,000 and \$270,000 for Services

Description of Contract Activity<sup>1</sup>

**Total  
\$ Amount**

[illegible]

File: OCT 2014/14-15





**San José-Santa Clara**  
Regional Wastewater Facility

# Capital Improvement Program Monthly Status Report for September 2014

November 6, 2014

This report provides a summary of the progress and accomplishments of the Capital Improvement Program (CIP) for the San José-Santa Clara Regional Wastewater Facility (Wastewater Facility or RWF) for the period of September 2014.

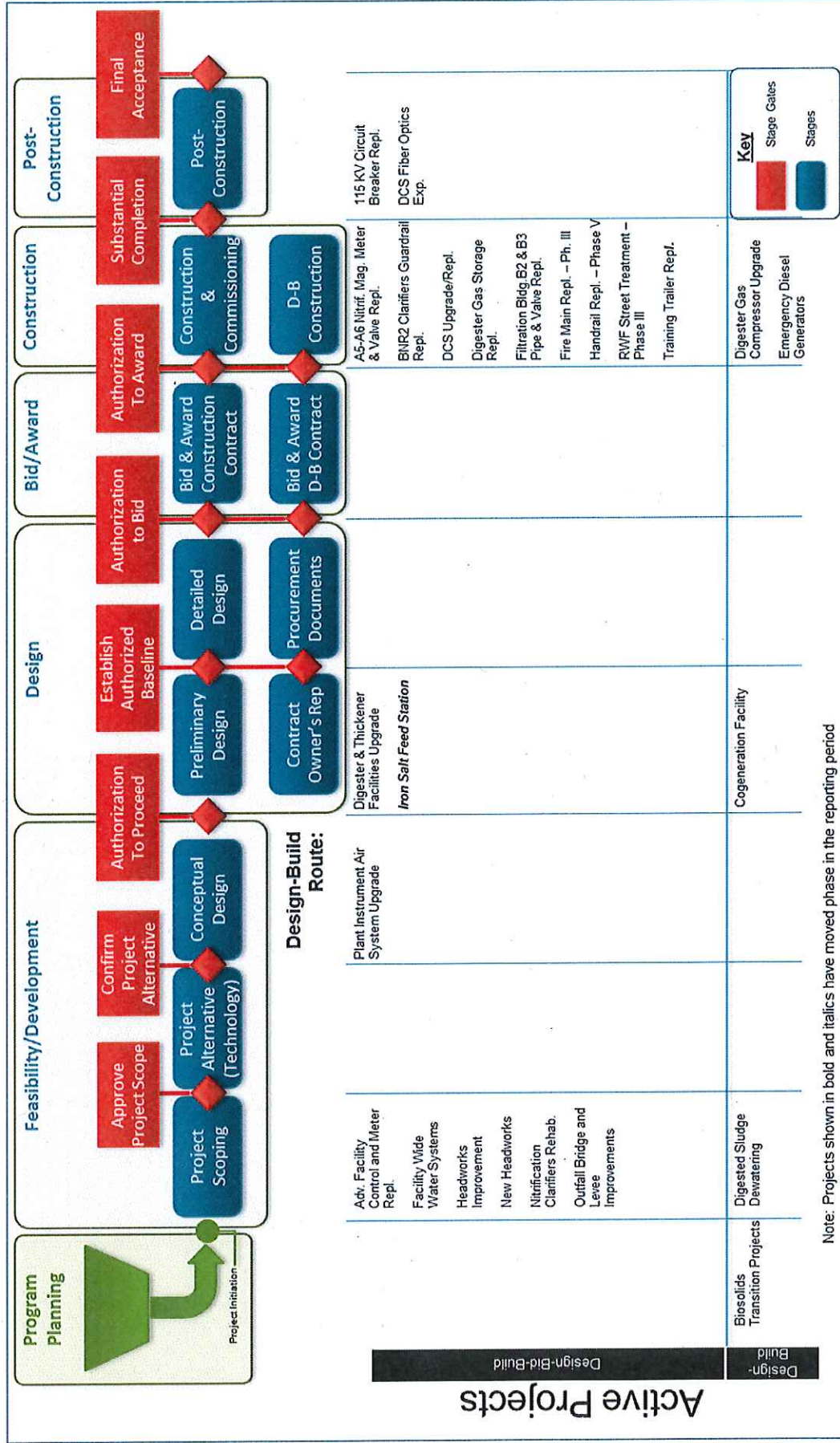
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# Project Delivery Model



Note: Projects shown in bold and italics have moved phase in the reporting period





## Program Summary

### September 2014

In the month of September, the program team made significant progress. Several programmatic studies and one project progressed through stage gates of the Project Delivery Model (PDM) process (see figure, inside of front cover). We saw particular focus on the development of our odor control implementation plan and biosolids transition strategy. Intense construction activity also continued within the RWF (see last page of this report). We started developing a procurement strategy for hiring various design consultants, and held an open house for potential consultants to share our upcoming projects and schedule (see Program Highlight below). We continued drafting an Operations Plan for the Wastewater Facility, which will include both unit process descriptions and an annual plan for coordinating CIP construction with ongoing operations.

We held several workshops to analyze our project schedules in a more in-depth fashion, which in turn will help us update our anticipated financial expenditures over the next 10 years. Finally, we continued driving implementation of our program tools and processes on all existing projects and brought several new staff on-board.

We held a special session with the Technical Advisory Committee (TAC) on September 22<sup>nd</sup>, to update them on the 10-year funding strategy. On that same day, CIP Program staff also attended a special TAC session on the Flow Study, which is being conducted by Carollo Engineers, under a separate agreement, outside of the program.

### Look Ahead

In October, our financial planning activities will continue, as we finalize the 10-year funding strategy. In addition, we will continue to implement the PDM and Stage Gate process. We will prepare materials to present an update on the biosolids transition strategy to TAC on October 30<sup>th</sup> and the Transportation & Environment Committee (T&E) on November 3<sup>rd</sup>. In addition, we will present the Semiannual CIP status report to T&E and TAC on October 6<sup>th</sup>, the Treatment Plant Advisory Committee on October 9<sup>th</sup>, and City Council on October 28<sup>th</sup>. At the end of October, staff will begin drafting the Proposed FY 15-16 Capital Budget and FY 16-20 CIP.

### Program Highlight – Vendor Open House

Implementation of the \$1.5 billion 10-Year CIP will require the participation of a number of wastewater treatment vendors, including design consultants, construction contractors, and equipment suppliers. In order to encourage competition, we strive to keep these vendors informed on the CIP program's progress and schedule. On September 25<sup>th</sup>, we held our second Vendor Open House at the Wastewater Facility (the first event was held in November 2012.) Attendees were given a tour of the RWF and a brief presentation outlining the upcoming projects and procurement process. Over 80 vendors attended the event. The CIP team will continue to update interested vendors by posting information to our public website.















Figure 1—Photos from the September 25<sup>th</sup> Vendor Open House



## Program Performance Summary

Seven KPIs have been established to measure the overall success of the CIP. Each KPI represents a metric which will be monitored on a regular frequency. Through the life of the CIP, KPIs will be selected and measured which best reflect the current maturity of the program. The target for the seventh KPI "Staffing Level" KPI will be established as part of the analysis of future staffing needs.

### Program Key Performance Indicators – Fiscal Year 2014-2015

KPI Description	Target	Actual	Status	Trend	Measurement
<b>Schedule</b>	85%	100% (1/1)			Percentage of CIP projects delivered within 2 months of approved baseline Beneficial Use Milestone. <b>Target: 85% of projects delivered within 2 months of approved baseline schedule or better.</b>
<b>Budget</b>	90%	0% (0/1) <sup>1</sup>			Percentage of CIP projects that are completed within the approved baseline budget. <b>Target: 90% of projects total expenditures do not exceed 101% of the baseline budget.</b>
<b>Expenditure<sup>2/3</sup></b>	≥\$94.2M	\$98.2M			Total CIP actual + forecast committed cost for the fiscal year compared to CIP fiscal year budget. <b>Target: Forecast committed cost meets or exceeds 60% of budget for Fiscal Year 14/15 (60% of \$157M = \$94.2M)</b>
<b>Procurement</b>	100%	100% (7/7)			Number of actual + forecast consultant and contractor procurements compared to planned for the fiscal year. <b>Target: Forecast /actual procurements for fiscal year meet or exceed planned.</b>
<b>Safety</b>	0	0			Number of OSHA reportable incidents associated with CIP construction for the fiscal year. <b>Target: zero incidents.</b>
<b>Environment/Permits</b>	0	0			Number of permit violations caused by CIP construction for the fiscal year. <b>Target: zero violations.</b>
<b>Staffing Level<sup>4</sup></b>	TBD	TBD	TBD	TBD	Percentage of authorized staffing level <b>Target: to be determined</b>

#### KEY:

Cost:  Meets or exceeds KPI target  Does not meet KPI target

#### Notes

1. For the budget KPI, the number of delivered projects increased from 0 to 1. This count includes Dissolved Air Flotation (DAF) Dissolution Improvement, which is \$96,260 (10.8%) over a baseline budget of \$891,000.
2. FY14-15 budget excludes reserves, ending fund balance, South Bay Water Recycling, Public Art and Urgent and Unscheduled Rehabilitation items
3. The Expenditure KPI Target Forecast percentage has been adjusted to reflect the decision to report against the total program budget including contingency (previously the total budget did not include contingency allowance).
4. Staffing level KPI measured quarterly; all other KPIs measured monthly.

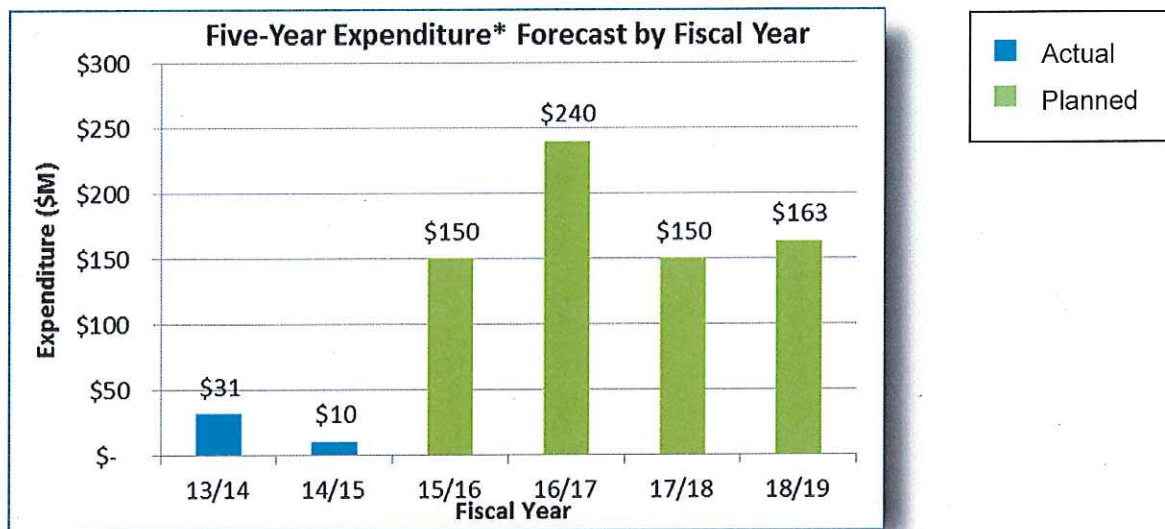


## Program Cost Performance

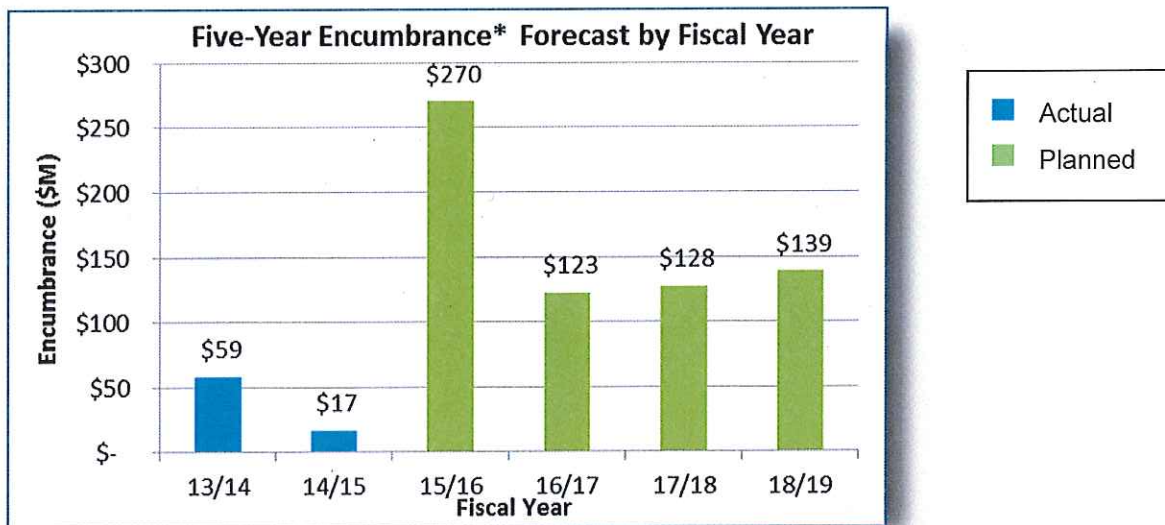
This section provides a summary of CIP cost performance for all construction projects and non-construction activities for FY14-15 and the Five-Year CIP.

### Adopted 2015-2019 CIP Expenditure and Encumbrances

To accommodate the proposed increase in expenditures and encumbrances over the next five years, the City is developing a long-term financial strategy to fund the needed, major capital improvements while minimizing the impact to ratepayers.



\*Expenditure defined as: Actual cost expended associated with services and construction of physical asset which may include encumbered amounts from previous years



\*Encumbrance defined as: Financial commitments, such as purchase orders or contracts, which are chargeable to an appropriation and for which a portion of the appropriation is reserved



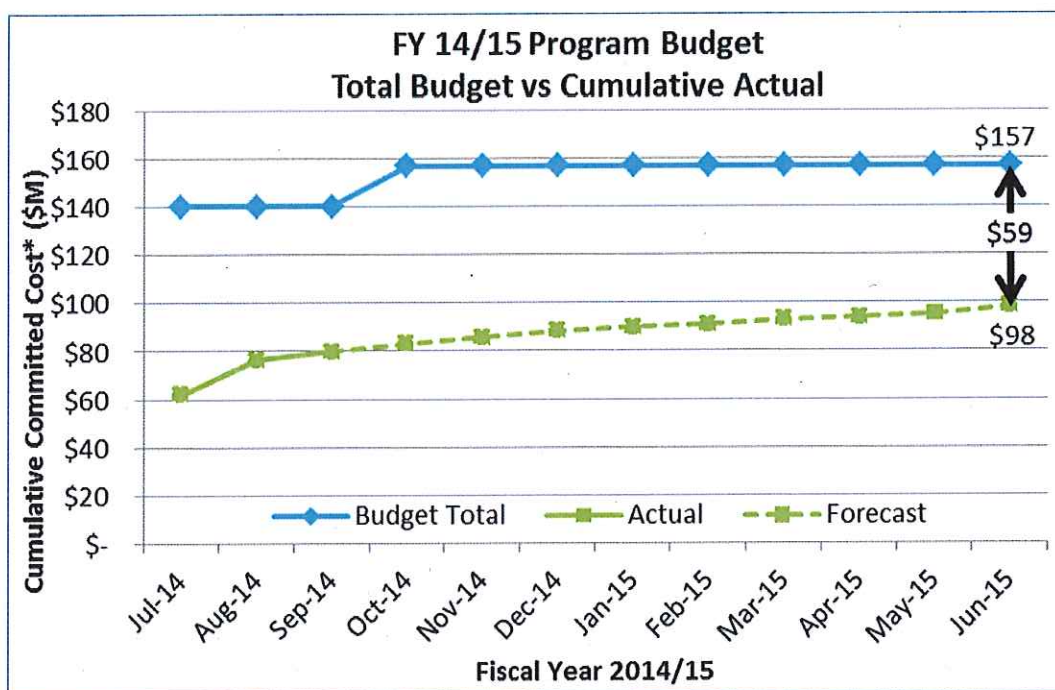


## Fiscal Year 2014-2015 Program Budget Performance

The fiscal year program budget is \$157 million. The budget amount of \$157 million represents the 2014-2015 budget of \$104 million plus carryover of \$53 million. The budget amount excludes reserves, ending fund balance, South Bay Water Recycling, Public Art and Urgent and Unscheduled Rehabilitation items. The budget now includes contingency allowance, which had been excluded from the amount shown in the August report.

The projected year-end variance of approximately \$59 million is primarily due to the following activities that are now expected to occur in FY15-16:

- Award of the Cogeneration Facility design-build contract
- Award of construction contracts for the Iron Salt Feed Station, Plant Instrument Air System Upgrade, and Switchgear S40/G3 Relay Upgrade projects
- Award of design contracts for critical rehabilitation work in the Headworks Improvements and Nitrification Clarifier Rehabilitation projects




























\*Committed costs are expenditures and encumbrance balances, including carryover (encumbrance balances from the previous fiscal year).



## Project Performance

There are currently 13 active projects in the construction or post-construction phase with a further 11 projects in feasibility/development, design or bid and award phases (see PDM graphic at the front of this report). All active projects are listed in the tables below. Projects in the construction phase have cost and schedule baselines established and are monitored using the City's Capital Project Management System (CPMS). These projects have green/red icons included in the table below to indicate whether they are on budget and schedule using the CPMS data as a source.

### Project Performance – Baselined Projects

Project Name	Phase	Estimated Beneficial Use Date <sup>1</sup>	Cost Performance <sup>2</sup>	Schedule Performance <sup>2</sup>
Distributed Control System (DCS) Fiber Optics Network Expansion	Post-Construction	May 2014		
115KV Circuit Breaker Replacement	Post-Construction	Jul 2014		
A5-A6 Nitrification Mag. Meter & Valve Replacement	Construction	Nov 2014		
RWF Street Rehabilitation - Phase III	Construction	Nov 2014		
BNR-2 Clarifier Guardrail Replacement	Construction	Mar 2015		
Filtration Building B2 & B3 Pipe & Valve Replacement	Construction	Mar 2015		
Handrail Replacement - Phase V	Construction	Mar 2015		
Fire Main Replacement - Phase III	Construction	Apr 2015		
Training Trailer Replacement	Construction	May 2015		
Digester Gas Storage Replacement	Construction	Jun 2015		
DCS Upgrade/Replacement	Construction	Jun 2016		
Digester Gas Compressor Upgrade	Construction	Jul 2016		
Emergency Diesel Generators	Construction	Aug 2016		

#### KEY:

Cost:		On Budget		>1% Over Budget
Schedule:		On Schedule		>2 months delay

#### Notes

1. Beneficial Use is defined as when the work is sufficiently complete, in accordance with the contract documents, so that the City can occupy or use the work. Beneficial use dates are being reviewed as part of project schedule reviews.
2. An explanation of cost and schedule variances on specific projects identified in this table is provided on page 9.
3. Beneficial use dates pending Contractor's Schedule.



## Project Performance – Pre-Baselined Projects

Project Name	Phase	Estimated Beneficial Use Date <sup>1</sup>
Cogeneration Facility	Design	Aug 2017
Digester & Thickener Facilities Upgrade	Design	Jun 2018
Adv. Facility Control & Meter Repl. Ph. 1	Feasibility/Development	Feb 2016
Plant Instrument Air System Upgrade	Feasibility/Development	Apr 2016
Iron Salt Feed Station	Feasibility/Development	Aug 2016
Outfall Bridge and Levee Improvements	Feasibility/Development	Aug 2018
Headworks Improvements	Feasibility/Development	Feb 2019
Digested Sludge Dewatering Facility	Feasibility/Development	Aug 2019
Nitrification Clarifiers Rehab.	Feasibility/Development	Feb 2021
New Headworks	Feasibility/Development	Jun 2021
Facility-wide Water Systems Improvements	Feasibility/Development	Sep 2021

### Notes

1. Beneficial Use is defined as when the work is sufficiently complete, in accordance with the contract documents, so that the City can occupy or use the work. Beneficial use dates are being reviewed as part of project schedule reviews.





## Significant Accomplishments

### Facility-wide Water Systems Improvements

The project team held a scoping workshop with CIP and operations and maintenance (O&M) staff to review the project's needs and objectives, solicit input regarding issues with the Wastewater Facility's aging water systems, and explore innovative ways to address the RWF's future water demands.

### Digester Gas Compressor Upgrade

In preparation for constructing the foundation for the new digester gas compressor building, the design-builder successfully relocated existing underground utilities and submitted structural calculations for City review.

### Emergency Diesel Generators

The project team started the application process required for PG&E to review and approve the submittals for the four new three-megawatt generators.

### Iron Salt Feed Station

The project successfully passed the Authorization to Proceed Stage Gate, enabling the project team to begin work on the preliminary design. The consultant, CH2M HILL, is scheduled to present the preliminary design report toward the end of October for City review.

### Programmatic Studies

Final technical memorandums were issued for the Design Criteria and Sizing Basis Study and Asset Management Strategy. Both studies are anticipated to be completed in October.

Three studies passed the Approve Scope Stage Gate: Aeration Demands and Biosolids Production Assessment, Automation Master Plan, and Yard Piping Condition Assessment Plan. Consultant service orders are expected to be executed and work to commence on these studies in October.

### Biosolids Transition

Brown and Caldwell issued draft technical memorandums for sidestream treatment, heat recovery, site evaluations, and business case evaluations, for City review. These documents will form the basis for the strategy and recommendations to be presented to TPAC in November and Council in December.

## Explanation of Project Performance Issues

### A5-A6 Nitrification Mag. Meter & Valve Replacement

A design issue was encountered during the startup of the project in September 2014. The electric motor specified in the design documents was 3 phase power, which is what the contractor submitted on, staff approved, and contractor installed. During the startup and turnover preparation, it was identified that while there is 3 phase power available further 'upstream' the power available at the actuator panel is only single phase. It has been determined that it would be more costly to pull additional wire to the actuator than it would be to reorder a single phase actuator/motor for each of the two valves in question. In addition, O&M has requested that the installation be single phase for consistency with other similar clarifiers. The contractor has submitted a proposal to install the requested single phase actuators, but it will require additional funds beyond the remaining contingency. A Council memo is being prepared to request additional funds to resolve the actuator issue. The approval for funding, approximately \$25K, is expected by January/February 2015, with installation by end of March.





## Project Profile

### Aeration Demands & Biosolids Production Assessment Study

The RWF has an existing process simulator that allows City staff to model the aeration treatment process stages using the BioWin™ software package. To provide more accurate estimates of flows and solids that can be used as a basis of design for upcoming CIP projects, staff needs a simulator to model equipment and treatment processes throughout the RWF.

This study will upgrade and expand the existing RWF process simulator to a Facility-wide simulator. This will extend the current modeled configuration to include preliminary, primary, secondary, and tertiary treatment streams, as well as primary effluent equalization, sludge thickening, sludge digestion, digested solids dewatering, and side stream treatment. To update and calibrate the process simulator, the consultant, Carollo Engineers, will conduct sampling that will be analyzed by the RWF's laboratory.

The first outputs from the study will provide updated estimates of future aeration demands and biosolids production, to inform current and future CIP projects. The updated simulator will also be used to answer key process inter-relationship questions for various upcoming upgrades, and will allow the impacts of planned modifications to existing treatment facilities to be accurately assessed. In the future, the simulator will be used to support ongoing Facility operations.

The consultant will begin work next month and the study is anticipated to be completed before June 2015. Study Budget: \$586,604.

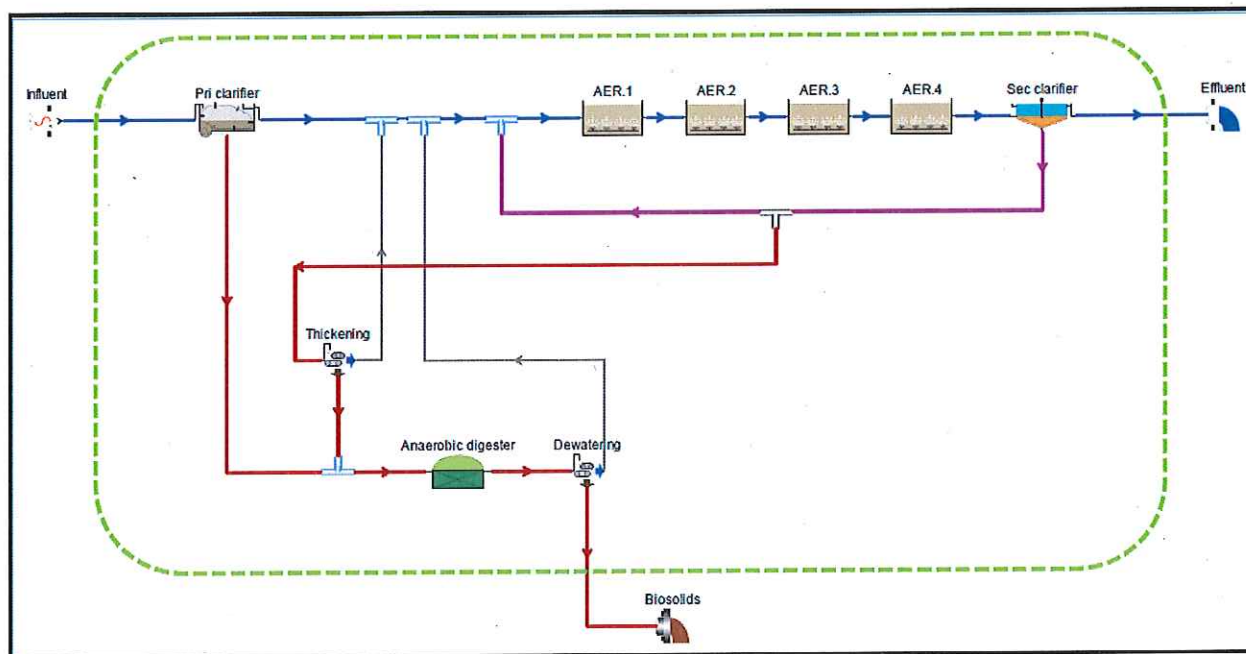


Figure 2— Example of a Process Modeling Diagram

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# Regional Wastewater Facility Treatment – Current Treatment Process Flow Diagram

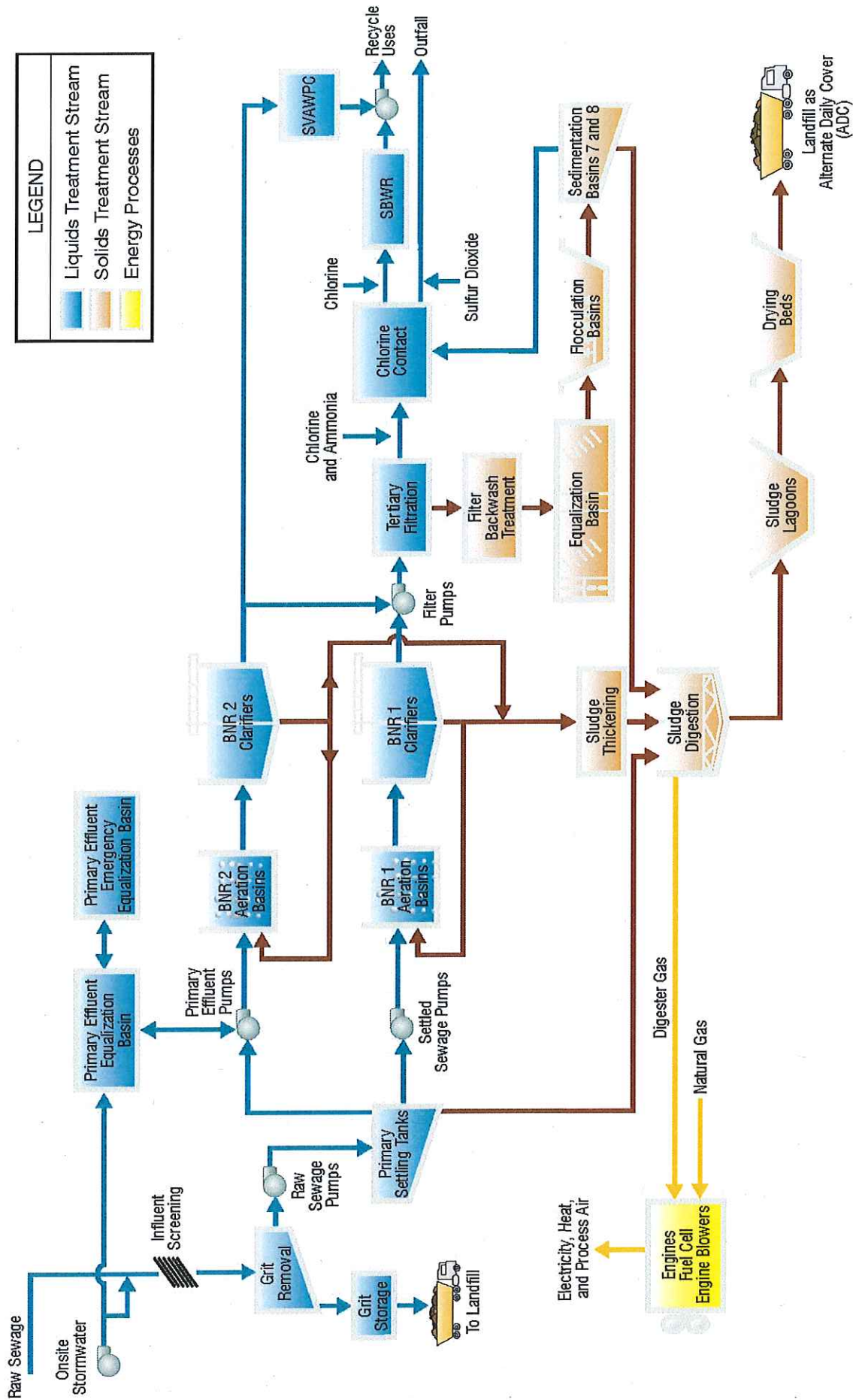


Figure 3—Current Treatment Process Flow Diagram



# Regional Wastewater Facility Treatment – Proposed Treatment Process Flow Diagram

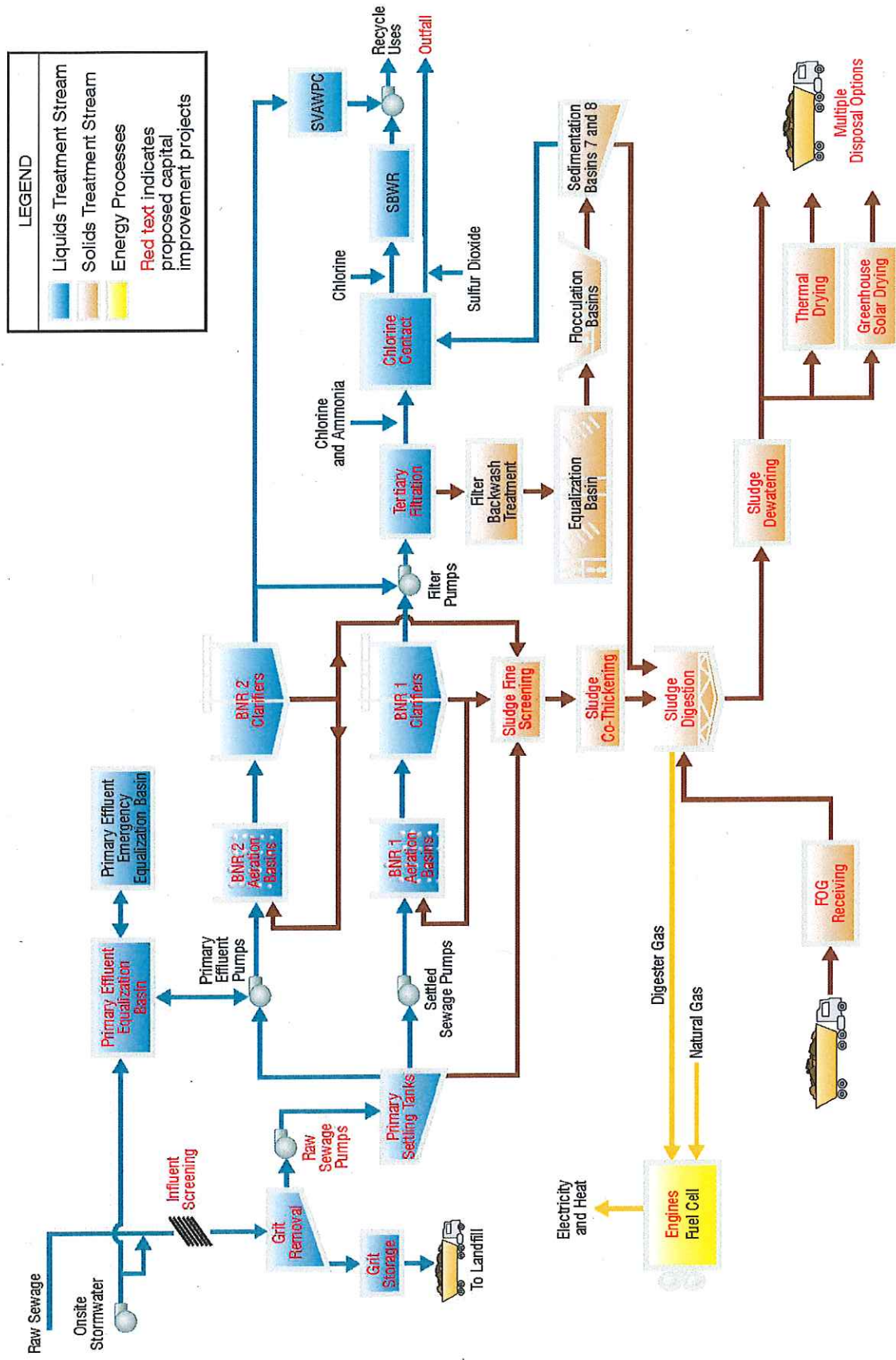


Figure 4—Proposed Treatment Process Flow Diagram



## Active Construction Projects – Aerial Plan

1. A5 A6 Nitrification Mag. Meter & Valve Replacement
  2. BNR2 Clarifiers Guardrail Replacement
  3. Digester Gas Storage Replacement
  4. Handrail Replacement Phase V
  5. Training Trailer Replacement
  6. Digester Gas Compressor Upgrade
  7. Filtration Building B2 & B3 Pipe & Valve Replacement
  8. RWF Street Rehabilitation - Phase III
- Facility-wide Projects (Not Shown)**
- DCS Upgrade/Replacement
  - Fire Main Replacement Phase III

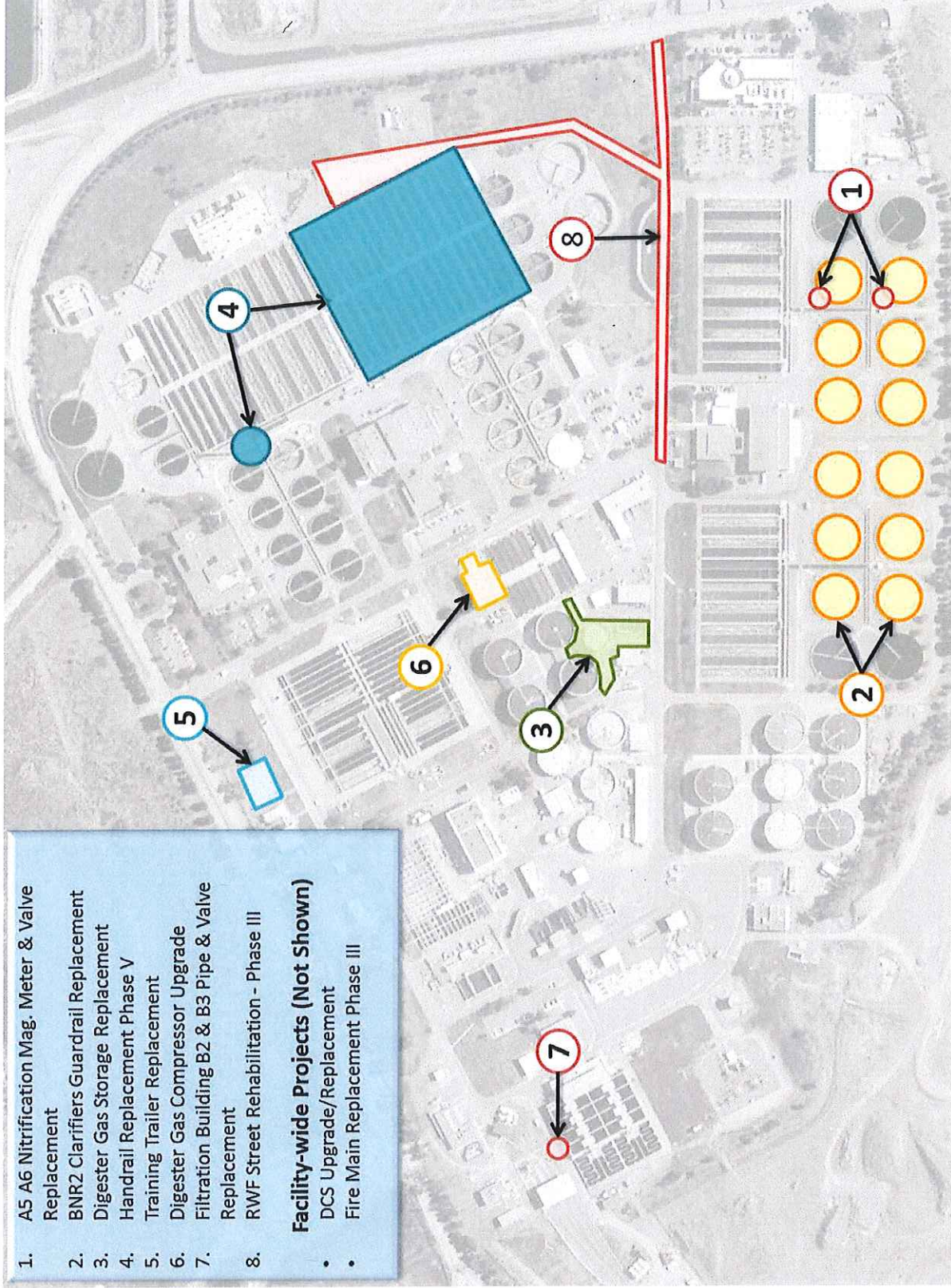


Figure 5—Active Construction Projects





# Memorandum

**TO:** TRANSPORTATION  
AND ENVIRONMENT COMMITTEE

**FROM:** Kerrie Romanow

**SUBJECT:** SANITARY SEWER FLOW  
STUDY UPDATE

**DATE:** October 29, 2014

Approved

Date

10-29-14

## REASON FOR REPLACEMENT

This replacement memo provides an updated version of the attachment, "City of San José Phase 2 Flow and Load Study Technical Memorandum No. 2" and corrects a reference to the revenue program in the Executive Summary.

## RECOMMENDATION

1. Accept the staff report regarding the attached Sanitary Sewer Flow Study and cross reference to the full Council on December 2, 2014; and
2. Recommend to the full Council approval of the proposed changes and policy recommendations for future updates to the revenue program for the San José-Santa Clara Regional Wastewater Facility.

## OUTCOME

Approval of the staff recommendations would update the assumptions regarding wastewater flow and household sizes for the cities of San José and Santa Clara and the Tributary Agencies; and establish a process for regular updates to assumptions for allocating wastewater treatment costs between the various agencies.

## EXECUTIVE SUMMARY

In August 2012, the Auditor issued a report entitled "Environmental Services: A Department at a Critical Juncture," and recommended (1) updating the assumptions for residential sanitary sewer rates, and (2) establishing a policy for periodic updates to these assumptions. The City retained Carollo Engineers to conduct a sewer flow study. The flow study involved a detailed flow analysis for residential customers, a strength analysis for residential and non-residential

customers, and a mass balance comparing estimated sewage discharges with influent to the San José-Santa Clara Regional Wastewater Facility<sup>1</sup> ("Wastewater Facility").

Residential flow assumptions for all agencies, with the exception of West Valley Sanitation District (WVSD), have not been updated since 1975. Based on the findings of this study and prior studies, the current San José-Santa Clara Regional Wastewater Facility Revenue Program (revenue program) residential flow assumptions should be updated to equitably distribute costs. Staff recommends updating these assumptions using a unique flow assumption (gallons per person per day) and household density (number of persons per household) for each agency and customer classification. This approach is equitable and provides the best representation of sewer flows. It also uses a methodology that is simple to update based on future census data and water consumption records.

To create a unique set of flow assumptions for each agency, Carollo Engineers evaluated almost 650,000 water consumption records of residential customers to estimate sewer flows. The Technical Advisory Committee (TAC), which is comprised of staff from San José, Santa Clara, and the Tributary Agencies, discussed the approach at a workshop on October 1, 2014. The flow assumptions for each jurisdiction including Santa Clara, Milpitas, San José, and WVSD were based on winter water consumption data. Carollo recommends that County Sanitation District No. 2-3 (CSD 2-3), Cupertino Sanitary District (CuSD), and Burbank Sanitary District (Burbank) use a weighted average flow until water consumption data can be used to determine their unique discharges.

Carollo performed a mass balance, which compares the measured flow, Biochemical Oxygen Demand (BOD), Total Suspended Solids (TSS), and Ammonia (NH<sub>3</sub>) entering the Wastewater Facility to the calculated values that result from the current rate calculation process, as well as the calculated values from the proposed alternatives. Carollo found that the actual loadings were not consistent with the assumptions from the Wastewater Facility revenue program. Staff recommends that San José, Santa Clara and the Tributary Agencies conduct a wastewater strength-sampling program. It would be reasonable to maintain the current concentrations, which are consistent with standard industry parameters, until a study is completed on the actual residential wastewater strength.

Unlike the residential flow, the non-residential water consumption data is reviewed on an annual basis in order to update individual customer flow, and strength amounts are updated pursuant to the Revenue Program Guidelines approved commercial user strength characteristics. Staff does not recommend any changes to the non-residential categories, flow or strength parameters.

It is recommended that the revenue program assumptions be updated every 10 years to ensure accuracy and equity. This may include a combination of updating the household densities used to estimate residential sewer flows based on the latest census information and review of water

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<sup>1</sup> The legal, official name of the facility remains San Jose/Santa Clara Water Pollution Control Plant, but beginning in early 2013, the facility was approved to use a new common name, the San José-Santa Clara Regional Wastewater Facility.



consumption data. It may also include updating residential and non-residential wastewater strength parameters based on more current loadings data.

## **BACKGROUND**

In August 2012, the City Auditor released audit Report 12-06, Environmental Services: A Department at a Critical Juncture. The audit scope included a review of the Sanitary Sewer Use Charge (SSUC) and the allocation of costs to customers. The Auditor recommended updating assumptions driving sanitary sewer rates for residential customers, and establishing a policy to periodically evaluate assumptions that influence rates, including household size, daily per capita sewage flow, and housing stock composition. The Administration agreed with this recommendation.

The Environmental Services Department (ESD) completed a preliminary flow study for the Wastewater Facility for San José residential customers in February 2013. Due to the short time frame of the study and the lack of easily accessible data on water use trends for the entire service area, the findings were based on a limited dataset. In a March 2013 Information Memo to Council, ESD described plans to prepare and release an RFQ for a consultant to expand the study to include the entire Wastewater Facility service area, water consumption data for multiple years, and commercial sector data.

The City did not receive any proposals in response to an RFQ for a consultant released in July 2013. The RFQ was revised based on feedback from potential proposers, and the City received multiple proposals in response to a revised RFQ released in October 2013.

The City retained Carollo Engineers Inc. in March 2014 to perform a sanitary sewer flow and load (strength parameters) study for the entire service area of the Wastewater Facility. The Wastewater Facility capital and operating and maintenance costs are allocated to the Tributary Agencies based on their sanitary sewer flow and strength parameters (BOD), (TSS), (NH<sub>3</sub>). The balance of the cost is shared by San José and Santa Clara based on each jurisdiction's share of the total assessed value for property in the two cities.

The first phase of the study was completed in May 2014. During this phase, Carollo Engineers compiled data pertinent to the sanitary sewer flow analysis work, reviewed the current revenue program and customer classifications, reviewed wastewater strength parameters used in the current revenue program, identified reporting variations, and developed an approach to complete their analysis of sanitary sewer flow and strength data. Staff provided the T&E Committee a status report in June and to Council on August 5, 2014.

Staff also provided TAC, a draft report on the preliminary findings and recommendations on July 16, 2014. TAC agreed with the recommendation to proceed updating the residential flow and household values based on a consistent approach, and to proceed with second phase. The analysis sets forth the results from the study's second phase.



## ANALYSIS

The revenue program is a cost recovery program which is subject to the SWRCB Revenue Program Guidelines. The sanitary sewer ratepayers supporting the Wastewater Facility are comprised of residential and nonresidential customers. Consequently, a change in the residential percentage of cost would necessarily impact the non-residential share of the cost. Staff determined through the flow study that the average household sizes (number of people per household) and residential flow per person have changed, resulting not only in a shift to each agency's share of the Wastewater Facility operating and maintenance costs, but also a shift between residential and non-residential users. Since each agency establishes their own methodology for sewer rates, the impact of changes to the residential assumptions will vary between the agencies.

### Flow Study Methodology and Analysis

Carollo Engineers engaged in four major sub-tasks: a detailed flow analysis for residential customers; a strength analysis for residential and non-residential customers; a mass balance comparing estimated sewage discharges with influent to the Wastewater Facility; and recommendations to update the wastewater flow and strength parameters used in the current revenue program.

Sewer rates are developed in conformance with the SWRCB "Revenue Program Guidelines for Wastewater Agencies," March 1998 edition (most recent edition), and in accordance with Proposition 218. The guidelines require that rates must recover costs of operations and maintenance (including replacement) from users of the system in proportion to the volume and strength of sewage discharged. To assure that system users are charged equitably for service, the system's annual revenue requirements are allocated separately for both capital and operations and maintenance to the parameters of flow, BOD, TSS, and NH3. State guidelines allow residential users to be divided into single family, multiple family, and mobile home subgroups to allow for more refined cost allocations. Each classification has its own estimated flows and loadings for single family, multiple family, and mobile homes. All other users are classified as non-residential, and include Commercial, Institutional and Monitored Industries subgroups.

### Residential Density

The revenue program has been using 1975 average countywide densities (number of people per household) of 3.37 people per household for single-family homes, 2.05 people per multi-family home, and 1.90 people per mobile home. Since 2006 and based upon a wastewater flow study conducted in 2005, WVSD uses average household sizes of 2.63, 2.46, and 2.41 respectively.

This study uses updated population estimates for a five-year period from the 2012 American Community Survey (ACS) to update the average household size. Census Tract data from the 2012 ACS was used to estimate the densities for the various agencies.

On a countywide basis, household sizes for both multi-family and mobile home have increased substantially since 1975. The 2012 ACS data also shows a 32% variance across the agencies for



average single-family household size, a 60% variance for multi-family household size, and a 67% variance for mobile home household size. Table 1 illustrates the residential densities (household sizes) used in the current revenue program (County 1975 and WVSD 2005) and the updated County and agency-specific densities (2012 ACS).

**Table 1: Residential Household Sizes (Number of persons per unit, or “Density”)**

Housing Type	County (1975)	WVSD (2005)	County (2012)	Milpitas (2012)	San José (2012)	Santa Clara (2012)	Burbank (2012)	CSD 2-3 (2012)	CuSD (2012)	WVSD (2012)
Single Family	3.37	2.63	3.15	3.54	3.34	2.96	2.76	3.63	2.94	2.74
Multi Family	2.05	2.46	2.37	2.73	2.53	2.26	2.64	3.29	2.47	2.06
Mobile Home	1.90	2.41	2.71	2.24	2.97	-	-	-	-	1.78

#### Residential Flows

San José, Santa Clara, and the Tributary Agencies calculate the “flow component” of the revenue program based on an estimated flat rate flow or gallons per day per household (GPD/household). This methodology used for the flow assumption is (1) the gallons per capita per day (GPCD) flow rate, multiplied by the (2) the number of persons per household. All of the agencies, with the exception of WVSD, use 219 GPD for single family, 123 GPD for multi-family and 124 GPD for mobile homes. Since 2006 and based on a 2005 study, WVSD uses 184 GPD for single-family, 160 GPD for multi-family, and 157 GPD for mobile homes.

The Phase 2 study updated residential flow assumptions by reviewing residential water consumption data during the winter months of January, February, and March. The assumption is that water consumption during the winter months would be primarily indoor consumption and best approximates residential sewer discharges. Three years of winter water consumption data from Milpitas, San José, Santa Clara, and WVSD was analyzed to determine the flow rate per household. Data for Burbank, CSD 2-3, and CuSD was not provided, so a weighted average from the other four agencies (almost 650,000 individual billing accounts) will be used to estimate values for those three agencies.

In order to eliminate outliers in the water consumption data, the consultant used two approaches: a flow cap of 400 gallons per day/household and a dynamic Interquartile Range (IQR) cap. The 400GPD/household is approximately twice the median single-family flow rate of the surveyed agencies and attempts to eliminate anomalous account recordings; however, it does not recognize accounts that consume over 400 GPD. A single cap of 400 GPD was selected because it has the advantage of consistency and does not favor one agency over another. Using the 400 GPD/household flow cap also better reconciles with the influent flow at the Wastewater Facility. While statistically valid, the IQR method creates a different cap across agencies and customer classes and could be considered biased. For example, an agency with a significant amount of



outdoor irrigators would have a higher average sewer discharge. The IQR method also results in higher average flows than we see at the Wastewater Facility. For these reasons, Carollo Engineers found the 400 GPD cap to be a reasonable method for eliminating unreasonably high data points that would otherwise skew the results.

Table 2 illustrates the updated gallons per person per day (GPCD) using county average household density, as well as illustrating updated residential flow per person using the 400 GPD/household cap and agency-specific household density. Please see the "Flow Cap" section of the attached Technical Memorandum No. 2 for additional information.

**Table 2: Residential flow per person (GPCD)**

Housing Type	County (1975)	WVSD (2005)	County (2012)	Milpitas (2012)	San José (2012)	Santa Clara (2012)	Burbank (2012)	CSD 2-3 (2012)	CuSD (2012)	WVSD (2012)
Single Family	65	70	60	51	60	61	60	60	60	68
Multi Family	60	65	61	55	59	72	61	61	61	65
Mobile Home	65	65	61	61	60	-	-	-	-	66

Carollo Engineers evaluated various approaches to establishing assumptions to update the Revenue Program including: (1) the current methodology of using the average countywide densities and flows for all households (except WVSD); (2) using the countywide density and each agency's individual flow; and (3) using the countywide flow and each agency's individual density.

At an October 1, 2014 TAC workshop, staff from San José, Santa Clara, and the Tributary agencies discussed methodology options and agreed that using agency specific flow and densities would best allow for a more equitable cost allocation due to the variance in flow and household size between the various jurisdictions. Since flow data from CSD 2-3, CuSD, and Burbank was unavailable, a weighted average per capita flow rate will be assumed for these agencies until consumption data can be obtained. Please see the "Updating Residential Flow Assumptions" section of the attached Technical Memorandum No. 2 for additional information.

Table 3 illustrates the updated gallons per household per day (GPD/household) for San José, Santa Clara, and the Tributary Agencies using county average household density, as well as illustrating updated residential flow per person using agency-specific household density. Table 4 illustrates the percentage change for household types.



**Table 3: Proposed Residential flow per household (GPD/household = Density x GPCD)**

Housing Type	County (1975)	WVSD (2005)	County (2012)	Milpitas (2012)	San José (2012)	Santa Clara (2012)	Burbank (2012)	CSD 2-3 (2012)	CUSD (2012)	WVSD (2012)
Single Family	219	184	197	181	200	181	166	218	176	186
Multi Family	123	160	149	150	149	163	161	201	151	134
Mobile Home	124	157	172	137	178	-	-	-	-	117

Density values (average household size) from Table 1; GPCD values from Table 2

**Table 4: Change in Residential flow per household (percent change from current assumption)**

Housing Type	County (1975)	WVSD (2005)	County (2012)	Milpitas (2012)	San José (2012)	Santa Clara (2012)	Burbank (2012)	CSD 2-3 (2012)	CUSD (2012)	WVSD (2012)
Single Family	219	184	-10.0%	-17.4%	-8.7%	-17.4%	-24.2%	-0.5%	-19.6%	1.1%
Multi Family	123	160	21.1%	22.0%	21.1%	32.5%	30.9%	63.4%	22.8%	-16.3%
Mobile Home	124	157	38.7%	10.5%	43.5%	-	-	-	-	-25.5%

#### Residential Customer Classifications

San José, Santa Clara, and the Tributary Agencies use single-family, multi-family, and mobile home classifications to distribute O&M costs in the revenue program. The consultant reviewed available data and municipal code definitions to determine how the different agencies classify each of the residential customers into one of these three groups. While the analysis revealed some differences in classifying residential properties, the overall discrepancies are relatively minor. Please see the "Residential Customer Classifications" section of the attached Technical Memorandum No. 2 for additional information.

#### Residential Strength Parameters

All of the agencies have used the same strength parameters for BOD (250 mg/L), TSS (250 mg/L), and NH<sub>3</sub> (35 mg/L) since 1975. While WVSD updated its flows for single-family and multi-family residences after a 2005 wastewater flow study, it did not change its strength parameters.

Neither the literature nor available data from other wastewater agencies supported changing the strength parameters currently used, which are in the typical range and have been approved by the SWRCB. After consultation with TAC, Carollo Engineers recommended leaving the current



strengths unchanged until a more thorough study could be performed to include analysis of residential sewage samples from all of the agencies.

*Non Residential Flow and Strength Parameters*

All accounts including commercial, industrial, and institutional users are grouped under the general heading of non-residential. The calculation of charges for most non-residential users is based on their water consumption and the strength parameters for the category to which they are assigned based on SWRCB Revenue Program Guidelines. Since sewage discharge is generally not measured directly, water consumption provides a proxy for sewer use. In some agencies, such as San José, water consumption for winter months is used to exclude irrigation flows and other outside uses that are higher during dry months. A return to sewer percentage is applied over a variety of commercial types. In other agencies, the water consumption for all 12 months is used, with a return to sewer percentage applied to adjust total consumption to exclude outdoor uses. Some businesses have much lower return factors that reflect on-site water consumption or evaporation, such as facilities with cooling towers.

For non-residential water consumption, a comparison was made between estimated sewer flows based on:

- (1) Annual water consumption using return to sewer percentages, which varied widely across agencies and
- (2) Annualized winter water consumption without the application of the return to sewer percentages. Winter water consumption was defined as water consumed during January, February and March.

The results show that in terms of non-residential water consumption, using annual water consumption data to estimate sewer discharges produces a higher water consumption estimate when compared to using annualized winter consumption data. The difference was found to be about 20%-30% between the two non-residential sewer flow methodologies used by the Wastewater Facility Agencies. There is no industry standard for estimating sewage flows across broad ranges of commercial and industrial classifications, and both approaches to estimate non-residential flow are reasonable and used by the wastewater industry. Without substantial flow monitoring data, it is not possible to definitively determine which approach is more accurate. However, estimating non-residential wastewater flows based on both winter water consumption and annual water consumption with a return to sewer factor are both widely accepted methods. In reviewing with TAC the analysis of using winter versus annual water data to estimate non-residential flow, there was a consensus that the existing data did not justify having all agencies use the same methodology, which could result in cost allocations that impacted individual agencies or users in ways that could not clearly be shown to be more fair than the current system. For additional information, please see the "Winter Versus Annual Non-Residential Flow Assumptions" section of the attached Technical Memorandum No. 2.

In each of the agencies, most of the non-residential users are combined into categories that are expected to have roughly similar strength parameters; however, the agencies do not use the same



combinations. San José uses 59 non-residential categories, while the other agencies use significantly fewer non-residential categories.

Individual non-residential accounts that discharge more than 25,000 gallons per day are treated differently, with their rates being based on direct monitoring of their sewage flow and strength parameters. There are only about 61 such accounts (monitored industries) in the entire service area.

The consultant reviewed the current user categories for non-residential accounts in all of the agencies, and tested some alternative methods to group them more uniformly into fewer categories. All of the current charges are based on strength parameters that have been approved by the SWRCB for many years and accepted by local agencies and users. After discussion with TAC, Carollo Engineers recommended that the current methods be continued unless a more detailed study with extensive sampling and analysis of wastewater flows from each user type in each agency could be performed.

#### Non Residential Customer Classifications

Across agencies, there is often significant variability in the assumed wastewater loading coming from a single class of non-residential customers as each agency employs its own set of loading assumptions for BOD, TSS, and NH<sub>3</sub>. In many cases, the loading assumptions are similar or identical for the same Standard Industry Classification (SIC) Codes. However, some loading assumptions are very different for the same SIC code for different agencies. These differences can lead to a disparity between how different customers, with similar load values, in the same SIC code, are charged by different agencies.

Carollo Engineers evaluated the potential benefit of classifying non-residential customers into groups based on common strength ratios. Carollo Engineers recommend sorting and grouping all non-residential users with similar impacts on the wastewater system within the same group. This methodology would reduce the number of non-residential customer categories. This approach was discussed at the October 1, 2014 Special TAC meeting and it was determined that it would initially involve significant administrative effort to implement this change, and that making this change absent updated non-residential strength information would not result in improved non-residential flow and strength estimates. For additional information, please see the "Non-Residential Classifications" section of the attached Technical Memorandum No. 2.

#### Mass Balance

A mass balance looks at the measured flow and loadings of the Wastewater Facility's influent, which is frequently sampled and analyzed. Carollo Engineers performed an analysis that allows for the assumptions made in the revenue program to be tested without doing new field work. By comparing the total measured flow, in millions of gallons per day, and the measured loadings, in pounds per day, with the calculated values based on the flow and strength parameters used in the Revenue Program, Carollo Engineers tested the reasonableness of current customer data assumptions for flow, BOD, TSS, and NH<sub>3</sub>. The study found that flow values for the current revenue program roughly approximates the amount of flow that enters the plant, but understates



the amount of BOD, TSS and NH3 entering the Wastewater Facility. Because the mass balance resulted in inconsistent loadings at the Wastewater Facility relative to the revenue program, it may be necessary to conduct a wastewater strength-sampling program. It is unknown whether the cause of the discrepancy is due to the residential or non-residential loading assumptions. A residential strength-sampling program should be commissioned first to see if the residential parameters are correct.

#### Impact of Recommended Changes

**Allocation of costs by agency:** Using the FY 2014-2015 revenue program as the baseline, it was determined that the impacts of the recommended changes to the allocation of costs across San José, Santa Clara, and the Tributary Agencies are minimal. The recommended changes result in less than a one percent change for each agency. Although the changes to overall allocations for each agency are minimal, the updated flows and household sizes may result in substantial changes between customer classes. Table 5 illustrates the potential change in cost allocation shifts between agencies using updated flow and household size. This table is provided to illustrate the potential impact of updating residential flow and household sizes.

**Table 5: FY 14-15 Treatment Plant O&M Cost Sharing Impact Using Updated Flows and Household Sizes**

FY 14-15 budgeted shares 3/11/14 reports to Tributary Agencies			POTENTIAL IMPACT OF NEW RESIDENTIAL FLOW ESTIMATES			
AGENCY	Percentage	O&M Budget Shares	Revised Percentage	% Increase (Decrease)	O & M Redistributed	\$ Increase (Decrease)
SJ	65.493	\$60,121,800	65.808	0.3150	\$60,411,300	\$289,500
SC	13.898	\$12,758,500	13.965	0.0670	\$12,819,700	\$61,200
WVSD	8.264	\$7,586,800	8.489	0.2250	\$7,793,100	\$206,300
CuSD	5.144	\$4,722,500	4.793	(0.3510)	\$4,399,800	(\$322,700)
Milpitas	5.966	\$5,476,500	5.658	(0.3080)	\$5,194,300	(\$282,200)
CSD2-3	.956	\$878,000	1.027	0.0710	\$943,000	\$65,000
Burbank	.279	\$255,900	0.260	(0.0190)	\$238,800	(\$17,100)
Total	100%	\$91,800,000	100%	0%	\$91,800,000	\$0

Because the revenue program is a cost recovery program, any change for one customer group or within the same customer group could impact the other customer groups. For example, as total flows to residential customers are changed based on updates provided by this study, there could be a shift of costs among the non-residential customers, assuming their flows are consistent year-over-year, and the budget that is allocated to all customers in the service area for the Wastewater Facility remains at the same level year-over-year. While the changes between broad user groups are small, the potential for greater changes between specific customer types is possible. The final cost allocation is dependent upon each user's total flow and strength parameters.

As stated above, updated flow assumptions for the residential sector could result in significant changes to the allocations for different customer classes. In addition, the rebuild of the Wastewater Facility may also require rate increases. A ten-year funding and rate study which



looks at both the regional Wastewater Facility is currently underway. Recommended changes as a result of the Flow Study, as well as findings from the ten-year funding and rate study, will be used to develop the revenue program cost allocation for FY 2015-2016.

### **Revenue Program Update**

To ensure accuracy and equity, it is recommended that the revenue program assumptions be updated every 10 years. This may include a combination of updating the household densities used to estimate residential sewer flows based on the latest census information and review of water consumption data. It may also include updating residential and non-residential wastewater strength parameters based on more current loadings data.

### **EVALUATION AND FOLLOW-UP**

In February-March 2015, as part of the annual revenue program process, San José will work with Santa Clara and all Tributary Agencies to allocate costs based on the updated flow and household size numbers. Each agency will then use their updated costs allocations, and other agency-specific factors, to set their rates. For San José, staff will bring forward any rate recommendations which may result from the flow study update as well as other CIP and O&M costs, to Council as part of the 2015-2016 budget process.

### **POLICY ALTERNATIVES**

***Alternative 1: Make no changes to the current residential household size or residential flow assumptions.***

**Pros:** The current rate model, household sizes and flow data have been approved by the State Water Resources Control Board (SWRCB), and no changes are required by that agency. Keeping the current household size and flow amounts minimizes changes to property owners' SSUC rate as well as minimizes cost shifts between San José, Santa Clara, and the Tributary Agencies.

**Cons:** The current rate model is based upon 1975 data. Census data indicate that average household sizes have changed since 1975, and therefore, using the 1975 number does not properly allocate costs between household categories. Based upon the results of the recent flow study, the residential flow assumptions using 1975 data do not reflect current usage characteristics.

**Reason for not recommending:** Using the 1975 data does not result in the proper allocation of costs between the residential categories or between San José, Santa Clara, and the Tributary Agencies.

***Alternative 2: Update county-wide average household size using the 2012 ACS data, and tributary-wide average residential flow assumptions determined by the 2014 Flow Study.***

**Pros:** Continues current rate model assumptions using service area averages.

**Cons:** Results in a shift in costs between agencies without taking into consideration each agency's specific residential flow assumption or each agency's service area average household size.

**Reason for not recommending:** Using system-wide averages does not result in the most equitable allocation of costs between the residential categories or between San José, Santa Clara, and the Tributary Agencies.

*Alternative 3: Update average household size by service area using the 2012 ACS data, and update residential flow assumptions by calculating the average residential flow across the entire service area.*

**Pros:** Updated average household size by service area is readily available for each service area. Data is not available from determine agency-specific residential flow assumptions for Cupertino Sanitary District, County Sanitation Districts 2-3, or Burbank Sanitary District.

**Cons:** Using agency-specific flow data for the four agencies which we have are able to update residential flow assumptions results in a more equitable allocation of costs for those agencies.

**Reason for not recommending:** Using average residential flow assumptions across the service area do not result in the most equitable allocation of costs between the residential categories or between San José, Santa Clara, and the Tributary Agencies.

*Alternative 4: Update agency-specific flow assumption data using an agency-specific IQR cap determined by the 2014 Flow Study.*

**Pros:** An IQR cap is a common way to identify outliers.

**Cons:** Using the IQR cap creates a different cap across agencies and customer classes and does not align with the recorded influent flow at the RWF.

**Reason for not recommending:** Using a unique IQR cap for each agency could be considered biased, and results in a higher sewer discharge than seen at the RWF.

## **PUBLIC OUTREACH**

In addition to the required posting of this item with the T&E and Council Agendas, the Flow Study was previously discussed at a T&E meeting on May 14, 2014. Special meetings of the TAC were held to discuss the study on July 16, 2014, September 22, 2014, and October 1, 2014 and the recommendations are agendaized for the regular November meetings of TAC and Treatment Plant Advisory Committee (TPAC). In early 2015, ESD will begin outreach activities to stakeholders to discuss potential impacts. Feedback from these outreach meetings will be incorporated into recommendations brought forward as part of the 2015-2016 sanitary sewer rate setting process.

This item is scheduled to be heard at the November 13, 2014 TPAC meeting, and the December 2, 2014 City Council meeting.



### **COORDINATION**

This memorandum has been coordinated with the City Attorney's Office, the City Manager's Budget Office, the Office of Economic Development, and the Housing Department.

### **COST SUMMARY/IMPLICATIONS**

The consultant's analysis provided recommended updates to the assumptions for residential sanitary sewer rates that may result in 2015-2016 cost shifts between the Wastewater Facility owners and Tributary Agencies, as well as cost shifts between user groups; however, no final determination has been made for 2015-2016. The results of the consultant's report, as well as the San José-Santa Clara Regional Wastewater Facility Ten-Year Funding Strategy (which will be brought forward for TPAC consideration and City Council approval in December), will be considered in developing the 2015-2016 San José-Santa Clara Regional Wastewater Facility Revenue Program.

### **CEQA**

CEQA: Not a Project, File No. PP10-067 (a) Increases or Adjustments to Fees, Rates & Fares.

/s/Ashwini Kantak for  
KERRIE ROMANOW  
Director, Environmental Services

For questions, please contact Ashwini Kantak, Assistant Director, at (408) 975-2553.

Attachment: City of San Jose Phase 2 Flow and Load Study Technical Memorandum No.2



**CITY OF SAN JOSÉ**

**PHASE 2 FLOW AND LOAD STUDY**

**TECHNICAL MEMORANDUM NO. 2  
FLOW ANALYSIS SERVICES**

**FINAL  
OCTOBER 2014**



**CITY OF SAN JOSÉ**  
**PHASE 2 FLOW AND LOAD STUDY**  
**TECHNICAL MEMORANDUM**  
**NO. 2**  
**FLOW ANALYSIS SERVICES**

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## **1.0 INTRODUCTION**

The City of San José's (City's) existing rate structure consists of flow and strength-based charges. Flow is measured in terms of average wastewater flow and strength is measured in terms of biological oxygen demand (BOD), total suspended solids (TSS), and ammonia (NH<sub>3</sub>). Treatment costs are recovered from San José and Santa Clara's customers and Tributary Agencies based on wastewater flow and strength.

Currently, the San José-Santa Clara Regional Wastewater Facility (RWF) Revenue Program allocates costs between the RWF Tributary Agencies, which include San José, Santa Clara, Milpitas, Cupertino Sanitary District (CuSD), County Sanitation District No. 2-3 (CSD 2-3), West Valley Sanitation District (WVSD), and Burbank Sanitary District (Burbank). In August 2012, the City Auditor recommended an update to the assumptions that are used in the sanitary sewer rates for residential customers, and to establish a policy to periodically evaluate the assumptions that influence rates, including household residential size, daily per capita flow, and housing stock composition.

In 2013, San José's Environmental Services Department (ESD) conducted a preliminary flow study for the treatment plant and San José's own residential customers. The study observed lower usages of water by San José households than has been assumed by the Revenue Program since 1975. It is also possible that the allocation factors currently used as the basis for the cost distributions in the Revenue Program are outdated and do not reflect current flow and loading discharge characteristics to the RWF. ESD concluded that a more robust analysis should be conducted to properly evaluate the flow and strength of contemporary wastewater in the service area. To this end, ESD has retained Carollo Engineers to review the Revenue Program's methodologies for equity and consistency and to evaluate that the current Program is consistent with State Guidelines.

This Technical Memorandum (TM) is the second phase in a two-step process that seeks to quantify the volume and strength of wastewater produced by residential and non-residential customer classes. The results of this study may be used to update San José's wastewater retail rates and the allocation of operations and maintenance (O&M) costs among the RWF agencies.

The objectives of this memo are:

- Conduct a detailed flow analysis for residential customers.
- Conduct a detailed strength analysis for residential and non-residential customers.
- Conduct a mass balance.

- Provide recommendations to update the wastewater flow and strength parameters used in the Revenue Program.

## 2.0 UPDATING RESIDENTIAL FLOW ASSUMPTIONS

Flow assumptions used in the Revenue Program are determined differently for residential and non-residential customers. This section discusses residential flow assumptions. Assumptions about residential sanitary flows and the composition of those (Flows, BOD, TSS, and  $\text{NH}_3$ ) are paramount to the allocation of costs between not only the individual Tributary Agencies but also to the distribution of costs between customer classifications within the agencies.

### 2.1 Current Residential Flow Assumptions Used in the Revenue Program

San José, Santa Clara, and the Tributary Agencies calculate the "flow component" of the Revenue Program based on an estimated flow, gallons per day per household (GPD/household). This assumption is calculated from 1) the gallons per capita per day (GPCD) flow rate and 2) the number of persons per household. All the agencies with the exception of WVSD use a consistent set of assumptions.

San José, Santa Clara, Milpitas, CuSD, CSD 2-3, and Burbank base residential flow assumptions on household size derived from demographic information last updated in 1975, and per capita flows based on a 1975 study. These assumptions are given in Table 2.1.

<b>Table 2.1 Current Residential Flow Assumptions Used in the Revenue Program for Current San José, Santa Clara, Milpitas, CuSD, CSD 2-3, and Burbank Phase 2 Flow and Load Study City of San José</b>			
	<b>GPCD Flow<sup>(1)</sup></b>	<b>Household Size<sup>(2)</sup></b>	<b>Residential Flow Estimate, GPD/Household</b>
Single-Family	65	3.37	219
Multi-Family	60	2.05	123
Mobile Home	65	1.90	124
<b>Notes:</b> (1) Per capita flows based on a study conducted as part of the first submittal of Revenue Program data in or prior to 1975. (2) Based on 1975 demographic information.			

WVSD conducted its own wastewater flow study in 2005. The results of this study have been approved for use in the Revenue Program. The study estimated population densities and wastewater discharges per dwelling unit as shown in Table 2.2.



<b>Table 2.2      Current Residential Flow Assumptions Used in the Revenue Program for West Valley Sanitation District<sup>(1)</sup> Phase 2 Flow and Load Study City of San José</b>			
	<b>GPCD Flow<sup>(2)</sup></b>	<b>Household Size<sup>(3)</sup></b>	<b>Residential Flow Estimate, GPD/Household</b>
Single-Family	70	2.63	184
Multi-Family	65	2.46	160
Mobile Home	65	2.41	157
<b>Notes:</b> (1) Capacity Allocation Study, RMC Water and Environment. February 2005. (2) Dry weather flow monitoring data within WVSD. (3) Based on a combination of census population and dwelling unit density data.			

Table 2.3 presents the flow assumptions that ESD developed based on its preliminary flow study for the treatment plant and San José's own residential customers in 2013. Because of a limited data set, the results of San José's 2013 study have not been incorporated into the Revenue Program. San José's 2013 study relied on a single year of consumption data and recommended using county-wide estimates of household populations. For the purposes of this Report, "Countywide" refers to the population and household density estimates for the entire Santa Clara County.

<b>Table 2.3      San José 2013 Flow Study, Not Part of The Revenue Program<sup>(1)</sup> Phase 2 Flow and Load Study City of San José</b>			
	<b>GPCD Flow<sup>(2)</sup></b>	<b>Household Size<sup>(3)</sup></b>	<b>Residential Flow Estimate, GPD/Household</b>
Single-Family	65	3.15	205
Multi-Family	55	2.37	130
Mobile Home	58	2.71	157
<b>Notes:</b> (1) "Estimated Residential Unit Flow Rates & Review of Strength Characteristics." RMC Water and Environment, February 2013. (2) 2011 winter consumption in San José. (3) 2011 Census countywide estimates.			

WVSD's 2005 study used household population values unique to their service area. As shown in Figure 2.1 and Figure 2.2, below, there is clearly a range of dwelling unit population densities throughout the RWF service area. Therefore, it is reasonable that San José, Santa Clara, and the Tributary Agencies use different household size assumptions in future Revenue Program updates. However, the current Revenue Program assumptions and the studies conducted by WVSD and San José are not based on consistent data sources or methodologies. Phase 2 of this study will use similar methods as these previous studies, but will rely on a longer historical consumption record and employ a uniform methodology that is clear, transparent, and consistent among all the Tributary Agencies.

Figure 2.1 Single-Family Dwelling Unit Density

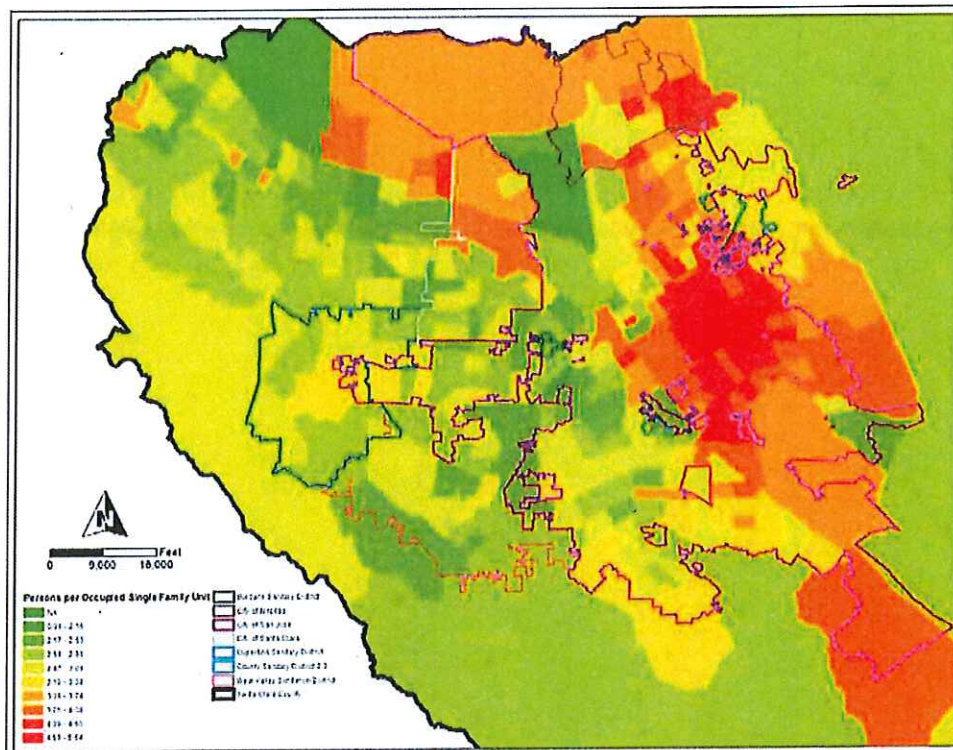
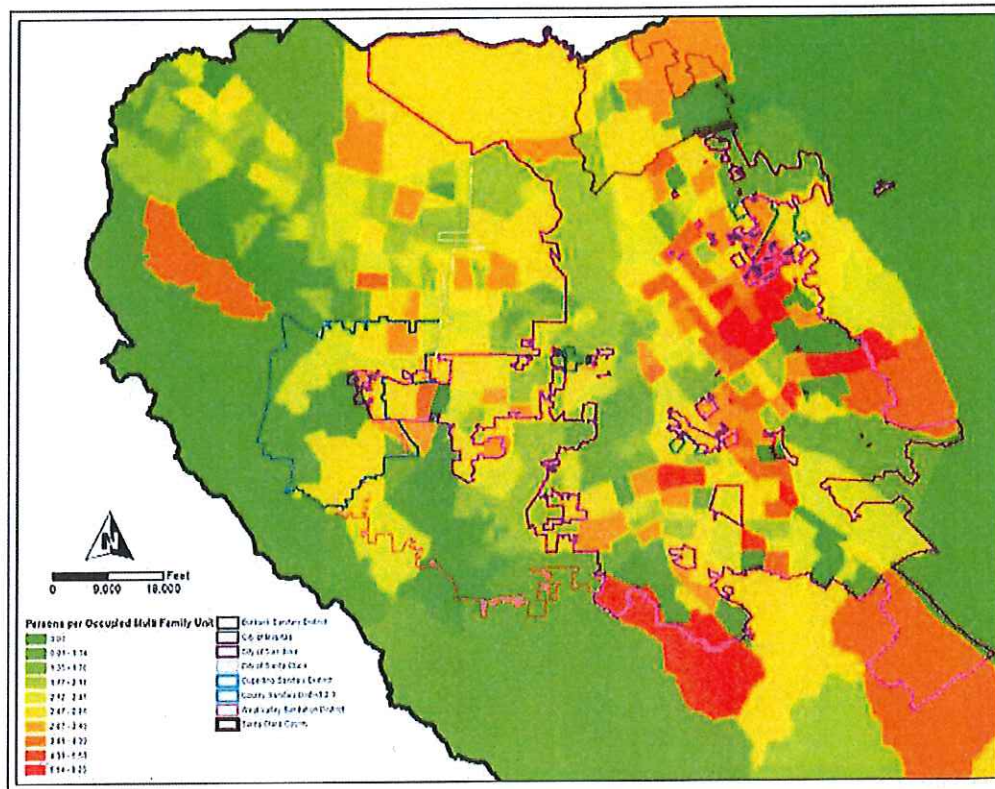


Figure 2.2 Multi-Family Dwelling Unit Density





## 2.2 Updating Residential Flow Assumptions

In order to provide any updates to the current flow assumptions used in the Revenue Program, a dataset larger than the dataset used for the 2013 Study had to be analyzed. The residential flow assumptions can be broken down into two components: (1) a residential per unit flow rate (GPD) per residential unit type; and (2) a residential household size (number of persons per residential unit type). Together, these two components can be used to obtain a residential per capita flow rate (GPD per person) in order to compare against the current Revenue Program assumptions. Residential flow assumptions were obtained for single-family, multi-family, and mobile home premise types since this is the basis for the Revenue Program

Updated residential flow assumptions were determined by reviewing residential water consumption data during the winter months when water use is assumed to be primarily indoor consumption. For this study, January, February, and March have been designated as the winter months as it is believed to provide a consistent low water demand period that best approximates residential sewer discharges. The process for estimating residential per unit flow rates for the different residential premise types (single family, multi-family, and mobile home) for the different entities is described in the following subsections.

### 2.2.1 Data Sources

Water consumption data was obtained from the San Jose Water Company, San Jose Municipal Water System (San Jose Muni Water), the City of Santa Clara and the City of Milpitas. Water consumption data for the West Valley Sanitation District from December 2009 to May 2012 was provided – this data had been pre-processed by RMC Water and Environment for use in this study.

Specific data is summarized below.

- San José
  - San Jose Muni Water
    - \* Years: 2006-2014
    - \* Residential and non-residential accounts
  - San Jose Water Company
    - \* Years: 2011-2014
    - \* Residential and non-residential accounts
  - Great Oaks Water Company
    - \* Years: 2005 - 2013<sup>1</sup>
    - \* Non-residential only

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<sup>1</sup> For consistency with San Jose's data, which went back to 2006, 2005 was not used in the analysis.

- Santa Clara
  - Years: 2005-2014
  - Residential and non-residential accounts
- Milpitas
  - Years: 2005-2014
  - Residential and non-residential accounts
- WVSD
  - Processed data was provided by RMC for the winters of 2010-2012

Other datasets used in this study include the 2012 San José wastewater-billing database and the residential water service points obtained from both the San Jose Water Company and San Jose Muni Water. These datasets were used to obtain both the number of units for each residential household type as well as the premise type of each residence. The 2012 5-year population and housing estimates from the United States Census Bureau were also used.

#### 2.2.2 Flow Cap

A “flow cap” was used to cap residential flows as a way to eliminate outliers in the consumption data. Although winter consumption data is an industry-accepted standard for estimating residential sewer discharges, considering the breadth of data collected for this study (almost 650,000 individual billing accounts) outliers are inevitable. Fortunately, these outliers are also identifiable. For example, the databases included some billing accounts with substantial outdoor irrigation usage, given California’s recent run of some of the driest winters on record. Additionally, some of the consumption records in San Jose Water Company’s billing database were found to have database irregularities. For example, the number of multi-family units in San José’s wastewater billing database did not always link cleanly to San Jose Water Company’s billing database. Therefore, it was possible for the number of units to be incorrect in which case the consumption was significantly overestimated.

To eliminate these outliers, Carollo employed two techniques: a single cap of 400 GPD/unit and a dynamic “IQR” cap unique to each agency and residential category.

- **IQR Cap.** This cap is calculated as  $1.5 \times \text{Interquartile Range (IQR)}$ . This is the most common way to identify outliers. For this study, this approach accounts for natural high volume users unique to each residential category and each agency. The IQR method is statistically valid, but it creates a different cap across agencies and customer classes and could be considered biased. For example, an agency with a significant amount of outdoor irrigators (which would increase the IQR cap) would have a higher average sewer discharge. In addition, this approach results in higher average flows than are currently assumed in the Revenue Program.



- **Single Cap.** A Single cap of 400 gpd/account resulted in a roughly normal tailed (positively skewed) distribution for all agencies and customer classes. This value is approximately double the median single-family flow value for all of the respective agencies. This approach attempts to eliminate anomalous account recordings. However, it does not recognize accounts that consume over 400 gpd. The 400 GPD value was selected because it roughly corresponds to the average IQR method for each customer class. The calculated IQR caps are shown in Table 2.4.

<b>Table 2.4      Calculated IQR Caps</b> <b>Phase 2 Flow and Load Study</b> <b>City of San José</b>			
<b>Agency</b>	<b>Single Family IQR Cap</b>	<b>Multi-Family IQR Cap</b>	<b>Mobile Home IQR Cap</b>
Milpitas	470	370	135
San José	540	380	243
Santa Clara	520	435	NA
WVSD <sup>(c)</sup>	605	400	175
<b>Weighted Average IQR Cap</b>	<b>542</b>	<b>391</b>	<b>234</b>

In collaboration with the Technical Advisory Committee (TAC), the 400 GPD cap was found to be a reasonable method for eliminating unreasonably high data points that would otherwise skew the results. Applying a single, uniform cap has the advantage of consistency and does not favor one agency over the other. Figure 2.3 illustrates the 400-GPD cap relative to the distribution of data for Single Family and Multi-Family. Not enough data was available to create a representative distribution for Mobile Homes. The Single Family GPD Histogram has been updated to include WVSD data. The Multi-Family GPD Histogram was not updated since only the recommended numbers from the RMC WVSD report were used.

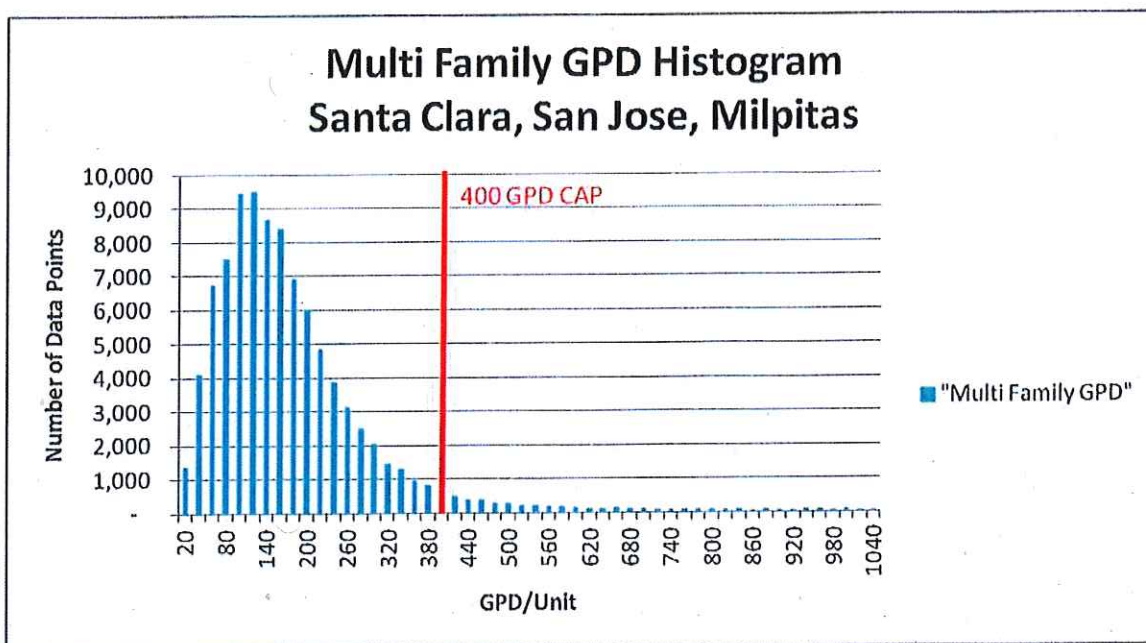
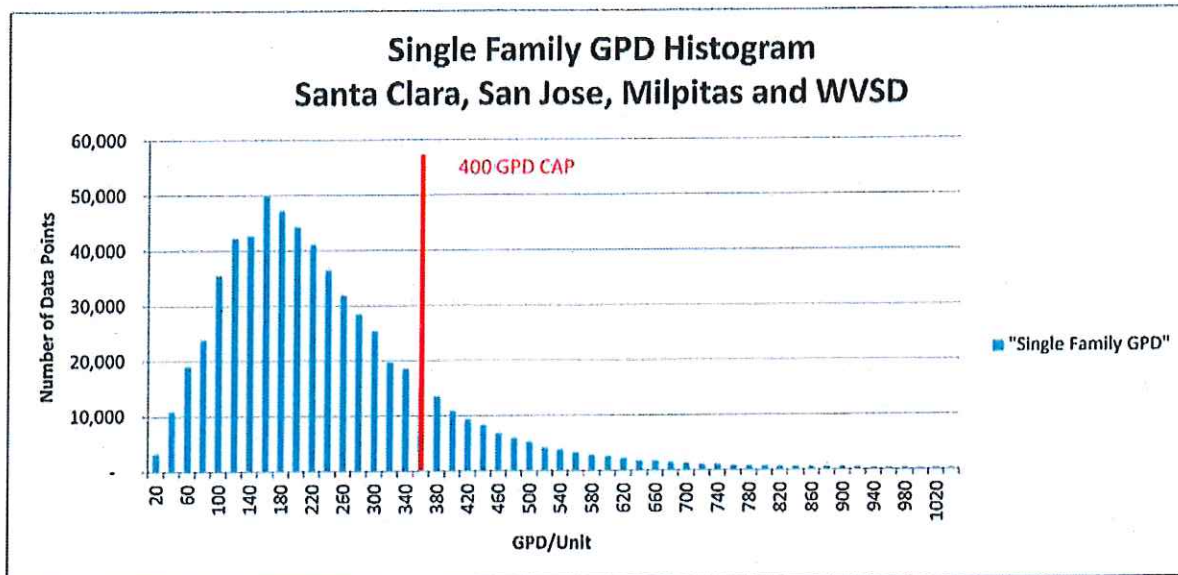


Figure 2.3 Single Family and Multi-Family Histograms Showing 400 GPD Cap

### 2.2.3 Per Capita Flow Rate Methodology

Per-capita flow rates are based on residential household sizes as determined by the US Census Bureau 2012 American Community Survey (ACS). Specifically, Table B25033 (Total Population in Occupied Housing Units by Tenure by Units in Structure) and Table B25032 (Tenure by Units in Structure) provide population and housing unit estimates for each census tract located in Santa Clara County. The two tables contain 5-year estimates, and thus were considered the most appropriate to use for this study since they contained the largest sample size. The population and housing unit estimates were used to calculate



residential household sizes for each premise type for the different agencies as well as Santa Clara County. Table 2.5 presents the findings of this analysis.

Once the per unit flow rates and the household sizes were obtained, a per capita flow rate for each premise type for the different agencies was calculated by dividing the per unit flow rate by the corresponding household size. The results are presented in Table 2.7, Table 2.9, Table 2.11, and Table 2.13.

<b>Table 2.5 Residential Household Sizes (Number of Persons per Unit)</b> <b>Phase 2 Flow and Load Study</b> <b>City of San José</b>							
<b>Residential Unit Type</b>	<b>City of Milpitas</b>	<b>City of San José</b>	<b>City of Santa Clara</b>	<b>Burbank Sanitary District</b>	<b>County Sanitation District No. 2-3</b>	<b>Cupertino Sanitary District</b>	<b>West Valley Sanitation District</b>
Single Family	3.54	3.34	2.96	2.76	3.63	2.94	2.74
Multi-Family	2.73	2.53	2.26	2.64	3.29	2.47	2.06
Mobile Home	2.24	2.97	-	-	-	-	1.78

#### 2.2.4 City of Milpitas

The City of Milpitas provided residential winter water consumption from 2005 to 2014 to estimate the City's residential flow rates (to be consistent with San Jose's data, only 2006-2014 was analyzed). The water consumption data already contained the premise type and the number of units for each household. A per unit flow rate was obtained by dividing the water consumption by the number of days between two successive meter reading dates, and dividing again by the number of units for each household. The per unit flow rates for each account for the winter months were then averaged per year. An average residential per unit flow rate, which excluded any flow rate greater than 400 GPD per unit, was obtained for both single family and multi-family premise types. The results are presented in Table 2.6.

<b>Table 2.6 City of Milpitas per Unit Flow Rates</b> <b>Phase 2 Flow and Load Study</b> <b>City of San José</b>			
	<b>GPD/Account SF</b>	<b>GPD/Account MF</b>	<b>GPD/Account MH</b>
2006	191	149	Not available due to data inconsistencies
2007	192	150	
2008	194	154	
2009	184	147	
2010	184	155	
2011	166	140	
2012	188	155	
2013	174	153	
2014	186	157	



Milpitas' mobile home data showed very low per-capita flow rates (approximately 30 GPCD in some years). See Table 2.7. After a close examination of the mobile home data, Carollo found two issues. The first was that the number of data points was very small, totaling only four accounts. The other issue was that although the consumption values for each account changed significantly from year to year, the number of units was relatively consistent. These issues led to the conclusion that the number of units in the database was incorrect, possibly due to fluctuating vacancies, and the number of data points too small to draw large conclusions. Therefore, Milpitas's mobile home data was not used in this analysis because a statistically significant number of reliable data points were not available.

<b>Table 2.7      City of Milpitas per Capita Flow Rates</b> <b>Phase 2 Flow and Load Study</b> <b>City of San José</b>			
	<b>GPCD SF</b>	<b>GPCD MF</b>	<b>GPCD MH</b>
2006	54	55	Not available due to data inconsistencies
2007	54	55	
2008	55	57	
2009	52	54	
2010	52	57	
2011	47	51	
2012	53	57	
2013	49	56	
2014	53	57	

#### **2.2.5      City of San José**

For the City of San José, datasets from the San Jose Water Company, San Jose Muni Water and the City of the San José were used to estimate the residential per unit flow rates. The premise types and the number of units for each household were obtained from the City of San José's wastewater billing database and the residential water service points obtained from both the San Jose Water Company and San Jose Muni. Flow rates were obtained from winter water consumption from 2011 to 2014, provided by the San Jose Water Company as well as winter water consumption from 2007 to 2014 provided by San Jose Muni.

In general, water accounts that contained winter water consumption data were linked to the corresponding wastewater accounts to determine the premise type as well as the number of units each account serves. The first step involved linking water consumption data with residential water service points through the Water Service Point ID. This allowed the water consumption data to be paired with parcel numbers and addresses.

For San Jose Muni, the parcel numbers were used to link the winter water consumption data with the wastewater billing database obtained from the City of San José. This linkage assigned a premise type and the number of units to San Jose Muni's winter water consumption data.

For the San Jose Water Company, the addresses were used to link the winter water consumption data with the wastewater billing database obtained from the City of San José. This linkage assigned a premise type and the number of units to the San Jose Water Company's winter water consumption data.

Once the number of units for the winter water consumption data was obtained, a per unit flow rate was calculated by simply dividing the water consumption by the number of days between two successive reading dates, and then dividing again by the number of units for each household. The per unit flow rates for each account for the winter months were then averaged per year. An average residential per unit flow rate, which excluded any flow rate greater than 400 GPD per unit, was obtained for single family, multi-family, and mobile home premise types. The results are presented in Table 2.8 and Table 2.9.

<b>Table 2.8      City of San José per Unit Flow Rates</b> <b>Phase 2 Flow and Load Study</b> <b>City of San José</b>			
	<b>GPD/Account SF</b>	<b>GPD/Account MF</b>	<b>GPD/Account MH</b>
2007	223	158	198
2008	217	157	181
2009	214	157	198
2010	202	153	198
2011	183	139	192
2012	220	152	149
2013	187	139	152
2014	206	140	154



<b>Table 2.9 City of San José per Capita Flow Rates Phase 2 Flow and Load Study City of San José</b>			
	<b>GPCD SF</b>	<b>GPCD MF</b>	<b>GPCD MH</b>
2007	67	62	67
2008	65	62	61
2009	64	62	67
2010	61	61	67
2011	55	55	65
2012	66	60	50
2013	56	55	51
2014	62	55	52

#### **2.2.6 City of Santa Clara**

The City of Santa Clara provided residential winter water consumption from 2005 to 2014 to estimate the City's residential per unit flow rates (to be consistent with San Jose's data, only 2006-2014 was analyzed). The water consumption data already contained the premise type and the number of units for each household. A per unit flow rate was obtained by dividing the water consumption by the number of days in the month that the meter was read, and dividing again by the number of units for each household. The per unit flow rates for each account for the winter months were then averaged per year. An average residential per unit flow rate, which excluded any flow rate greater than 400 GPD per unit, was obtained for both single family and multi-family premise types. Santa Clara does not report any mobile home accounts in the Revenue Program. The results are presented in Table 2.10 and Table 2.11.

<b>Table 2.10 City of Santa Clara per Unit Flow Rates Phase 2 Flow and Load Study City of San José</b>			
	<b>GPD/Account SF</b>	<b>GPD/Account MF</b>	<b>GPD/Account MH</b>
2006	182	162	Not applicable
2007	195	167	
2008	189	165	
2009	182	165	
2010	170	159	
2011	173	158	
2012	199	170	
2013	187	165	
2014	198	168	

<b>Table 2.11 City of Santa Clara per Capita Flow Rates Phase 2 Flow and Load Study City of San José</b>			
	<b>GPCD SF</b>	<b>GPCD MF</b>	<b>GPCD MH</b>
2006	62	72	Not applicable
2007	66	74	
2008	64	73	
2009	61	73	
2010	58	70	
2011	58	70	
2012	67	75	
2013	63	73	
2014	67	74	

### 2.2.7 West Valley Sanitation District

West Valley Sanitation District provided data from 2010 to 2012 that had been obtained and processed by RMC Water and Environment as part of WVSD's 2014 Study titled "Residential Wastewater Unit Flow Rate Analysis." Carollo reviewed RMC's methods for determining the residential flow rates and found that RMC did not apply a GPD cap to single-family residences in the same way that Carollo did for Santa Clara, Milpitas, and San José's data. Therefore, Carollo used RMC's data and applied the 400 GPD cap, using the same methods in this study, and found a slightly higher household flow rate, 186 GPD/unit versus RMC's value of 180 GPD/unit. For single family, Carollo recommends using the calculated value of 186 GPD/unit for the Revenue Program updates for consistency with other agencies.

For multi-family and mobile homes flows, RMC manually excluded individual outliers caused by outdoor irrigation and data irregularities; no cap was applied to the data. Such a detailed analysis was not reasonable for the other agencies given the substantial amount of information involved. However, the methods are more detailed than applying a GPD cap. Therefore, the results of RMC's study for multi-family and mobile homes are recommended for use in the Revenue Program updates in lieu of new calculations that would be based on a 400 GPD cap.

The results are presented in Table 2.12 and Table 2.13.



<b>Table 2.12 West Valley Sanitation District per Unit Flow Rates</b> <b>Phase 2 Flow and Load Study</b> <b>City of San José</b>			
	<b>GPD/Account SF</b>	<b>GPD/Account MF</b>	<b>GPD/Account MH</b>
2010	176	135 <sup>(1)</sup>	117 <sup>(1)</sup>
2011	185		
2012	201		
Note: (1) Based on WVSD 2014 Study "Residential Wastewater Unit Flow Rate Analysis."			

<b>Table 2.13 WVSD per Capita Flow Rates</b> <b>Phase 2 Flow and Load Study</b> <b>City of San José</b>			
	<b>GPCD SF</b>	<b>GPCD MF</b>	<b>GPCD MH</b>
2010	64		
2011	68	65 <sup>(1)</sup>	66 <sup>(1)</sup>
2012	73		
Note: (1) Based on WVSD 2014 Study "Residential Wastewater Unit Flow Rate Analysis."			

### 2.2.8 Summary of Detailed Flow Analysis

Table 2.14, below, shows a summary of the data collected as part of this study relative to the current revenue program and RMC's 2013 study. The results for this study are shown as an aggregate of data from San José, Santa Clara, Milpitas, and West Valley.

Although data was reviewed as far back as 2006 for Santa Clara, Milpitas, and parts of San José, WVSD was only able to obtain data from 2010 to 2012 for their service area. Therefore, only these three years were used to compare consumption data between the agencies. A review of longer consumption records show that this period had an overall lower winter water use than previous years. In fact, 2011 was substantially lower for all agencies across all residential categories. Lower water use could be indicative of low winter outdoor water use and thus a better representation of sewer flows. For this reason, the study relied on the smaller dataset of consumption from 2010 to 2012.

<b>Table 2.14 Residential Flow Rate Comparison Phase 2 Flow and Load Study City of San José</b>							
Basis	Source	GPD/ Household			GPD/Capita		
		SF	MF	MH	SF	MF	MH
Current Revenue Program	1975 Data San José, Santa Clara, Milpitas, CSD 2-3, Burbank, CuSD	219	123	124	65	60	65
	2005 Study WVSD	184	160	157	70	65	65
2013 RMC Study	2011 San José Only				65	55	58
Results from this Study	Weighted Average Santa Clara, San José, Milpitas, WVSD 2010 - 2012	197	149	172 <sup>(1)</sup>	60	61	61 <sup>(1)</sup>
Note: (1) Does not include Milpitas' mobile home data because a statistically significant dataset was not available for this agency.							

### 2.2.9 Recommended Update to Revenue Program Residential Flow Assumptions

In order to determine the basis for updating the Revenue Program flow assumptions, several alternatives were considered. For each alternative, equity and consistency factors were considered.

- Flow Update Alternative 1: This alternative mirrors the current revenue program's methodology using a single per-capita flow assumption and countywide household densities for each customer class. Essentially, this means that each agency uses the same GPD/household value for each customer category. Because the range of per-capita flows varied among agencies (as shown in previous sections), a standard regional flow of 60 GPCD was selected as a single, representative flow. This flow, 60 GPCD, is consistent with both the results of this study and with indoor water use studies by other agencies (e.g. EBMUD) and industry design parameters (i.e., Metcalf & Eddy).
  - Pros: Consistent with most agencies in California and it can be easily administered
  - Cons: Does not consider differences between agencies, especially household densities and water demands that have been shown to vary across the region.
- Flow Update Alternative 2: This alternative is similar to Alternative 1 in that a standard 60 GPCD flow would be applied across all agencies; however, each agency would use unique household densities per the 2012 ACS census information. The result would be a unique overall flow/household for each agency.



- Pros: Acknowledges different densities between agencies
- Cons: May over or under estimate flow for certain agencies because specific density information is used with no corresponding adjustment to per-capita flow rates.
- Flow Update Alternative 3: Alternative 3 is the most detailed approach in that it uses agency-specific per-capita flow rates and densities.
  - Pros: This is perhaps the most equitable and defensible approach.
  - Cons: No data was received from CSD 2-3, CuSD, and Burbank so a unique per-capita flow rate cannot be determined for these.

At a TAC workshop on October 1, 2014, the Agencies selected Alternative 3 as the preferred method because it was the most detailed and equitable. It was decided that weighted average per-capita flow rates would be assumed for CSD 2-3, CuSD, and Burbank until consumption data can be obtained for these agencies. Table 2.15 presents the results of Alternative 3 (the recommended alternative). Detailed results for each alternative can be found in Appendix B. The resulting total residential flow from each agency using the Alternative 3 flow assumptions is shown in Table 2.16.

### **2.3 Return to Sewer Percentage Methodology**

The Return to Sewer Percentage represents the amount of winter water consumption that returns to the sewer as sanitary flow. In California and throughout the United States, it is common to apply reduction factors to winter water usage to further refine sewer flow estimates for sewer capacity and other special studies. In their 2011 "Draft Flow Modeling and Limits Report" report, the East Bay Municipal Utility District found 90 percent of the winter water consumption to be a good estimate of sanitary flow. Carollo's estimated sewer flows from winter water consumption data for the City of Tulare, Padre Dam Municipal Utility District, and Lake Elsinore Valley Municipal Water District and found Return to Sewer Percentages of 89 percent, 95 percent, and 91 percent, respectively.

Return to Sewer Percentages are determined by comparing indoor water consumption to measured sewer flows. For this study, Return to Sewer Percentages were determined by comparing winter consumption data to calibrated sanitary flows in San José's collection system hydraulic model. Consumption data from San José, Santa Clara, and WVSD was available for this analysis. However, the analysis was limited to San José and Santa Clara since WVSD conducted a study in 2014 to determine their own Return to Sewer Percentage.

<b>Table 2.15 Recommended Update to Revenue Program Residential Flow Assumptions (Alternative 3) Phase 2 Flow and Load Study City of San José</b>			
<b>Single Family</b>	<b>GPCD based on 2010-2012 Consumption Data</b>	<b>Density – 2012 ACS Census</b>	<b>GPD/ Household</b>
Milpitas	51	3.54	181
San José	60	3.34	200
Santa Clara	61	2.96	181
Burbank <sup>(1)</sup>	60	2.76	166
CSD 2-3 <sup>(1)</sup>	60	3.63	218
CuSD <sup>(1)</sup>	60	2.94	176
WVSD	68	2.74	186
<b>Multi-Family</b>	<b>GPCD based on 2010-2012 Consumption data</b>	<b>Density – 2012 ACS Census</b>	<b>GPD/ Household</b>
Milpitas	55	2.73	150
San José	59	2.53	149
Santa Clara	72	2.26	163
Burbank <sup>(1)</sup>	61	2.64	161
CSD 2-3 <sup>(1)</sup>	61	3.29	201
CuSD <sup>(1)</sup>	61	2.47	151
WVSD <sup>(3)</sup>	65	2.06	134
<b>Mobile Home</b>	<b>GPCD based on 2010-2012 Consumption data</b>	<b>Density – 2012 ACS Census</b>	<b>GPD/ Household</b>
Milpitas <sup>(2)</sup>	61	2.24	137
San José	60	2.97	178
Santa Clara	-	-	
Burbank	-	-	
CSD 2-3	-	-	
CuSD	-	-	
WVSD <sup>(3)</sup>	66	1.78	117
<b>Notes:</b> (1) Based on weighted averages; no data available for this agency. (2) Based on weighted averages; a statistically significant dataset not available for this agency. (3) Based on WVSD's 2014 flow study.			



<b>Table 2.16 Total Residential Flow Using the Alternative 3 (Recommended) Flow Assumptions</b> <b>Phase 2 Flow and Load Study</b> <b>City of San José</b>				
<b>Flow Scenario</b>	<b>Current Revenue Program (MG)</b>	<b>Alternative 1 Standard 60 GPCD Countywide Density (MG)</b>	<b>Alternative 2 Standard 60 GPCD Unique Densities (MG)</b>	<b>Alternative 3 Unique GPCD Unique Densities (MG)</b>
Milpitas	1,324	1,248	1,403	1,222
San José	20,362	19,374	20,604	20,499
Santa Clara	2,669	2,685	2,543	2,849
Burbank	104	98	94	94
CSD 2-3	369	319	370	370
CuSD	1,471	1,340	1,281	1,286
West Valley	2,744	2,735	2,372	2,665
<b>Total</b>	<b>29,044</b>	<b>27,800</b>	<b>28,666</b>	<b>28,985</b>

For this study, Return to Sewer Percentages were determined by comparing 2008 winter consumption data (a proxy for indoor consumption) to calibrated residential sanitary flows in San José's collection system hydraulic model. The hydraulic model contains over 2100 individual "subcatchments." Each modeled subcatchment was calibrated based on measured dry-period sewer flows in 2008 as part of San José's Sanitary Sewer Master Plan Capacity Assessment. The hydraulic modeling process devoted substantial effort to parse out residential, non-residential, and base (Inflow and Infiltration) sewage flows using techniques well established in the industry. The result was a single residential flow for each estimate based on actual sewer flow data that could be used for this study. To compare to the model data, consumption data was linked to parcels and then aggregated into each modeled subcatchment. The Return to Sewer Percentage was calculated as the total calibrated residential sewer flow divided by the total winter consumption.

In 2008, there was limited data available for San José. That data corresponded only to those areas served by San Jose Muni Water. In total about 20,000 consumption records were linked to individual parcels. Subcatchment flow from a substantial amount of the City had to be extrapolated based on housing counts and the per-house water consumption averages as described in previous sections. Actual 2008 consumption data was used wherever possible. The result was a Return to Sewer Percentage of roughly 90% based on the results of 1,846 subcatchments. This result essentially validates the average residential flow rates shown in Table 2.8 and Table 2.9. However, by itself, more data in the form of consumption records and sewer flow monitoring data in the same year would be needed to more accurately determine the Return to Sewer Percentage for San José.

A much more definitive Return to Sewer Percentage was determined for Santa Clara. About half of the City of Santa Clara is included in the hydraulic model. The City provided 2008 consumption data that linked to parcels via APN. Approximately 99% of parcels that are tributary to San José's collection system (and thus represented in the model) were linked to winter billing data. The result was an 89 percent Return to Sewer Percentage based on almost 63,000 consumptive records.

The overall conclusion is that winter billing data is a good proxy for estimating residential sewer discharges in San José and the City of Santa Clara.

	Average Return to Sewer Percentage
San José <sup>(1)</sup>	90%
Santa Clara <sup>(2)</sup>	89%
Notes:	
(1) Based on a combination of 2008 consumption records for Muni Water and on City-wide average winter consumption (180 GPD SF, 149 GPD MF, 178 GPD, MH) and modeled sewer flows calibrated to measured 2008 sewer flow data.	
(2) Based on a comparison of 2008 consumption records to modeled sewer flows calibrated to measure 2008 sewer flow data.	

## 2.4 Residential Customer Classifications

San José, Santa Clara, and the Tributary Agencies use single-family, multi-family, and mobile home classifications to distribute O&M costs in the Revenue Program. Carollo investigated how San José, Santa Clara, and Milpitas classify each of the residential customers into each of these three groups. Data was not available from West Valley, CSD 2-3, or CuSD, and therefore no investigation was conducted for those agencies.

In many cases, the billing data was not resolute enough to distinguish between special housing types. Instead, Carollo depended on municipal code definitions or a sampling analysis to place each of the special cases into one of the Revenue Program classifications. The sampling analysis consisted of comparing several multi-family data samples using Google Earth to the billing database classification. The results of this analysis are presented in the Table 2.17.

Ideally, each agency would use the same customer classification definitions. However, the overall discrepancies are relatively minor and potential equity discrepancies are at least partially mitigated by using each agency's unique consumption data to determined residential sewer flow rates (this is the approach recommended in Section 2.2.9). For example, Santa Clara classifies some customers as multi-family that other agencies would not consider multi-family. However, the average multi-family flows determined for Santa Clara accounts for this discrepancy and Santa Clara would pay accordingly.



Table 2.17 Residential Premise Types Phase 2 Flow and Load Study City of San José			
Special Residential Type	San José	Santa Clara	
Townhomes	A townhouse falls within the definition of a single family residence under San José Municipal Code Section 15.12.460, as it is designed, improved or used as a residence for one family only and does not fall into the category of a two-family residential, multiple-family residential or a residential condominium, which are also specifically defined in Section 15.12.460.	Based on a sampling analysis, Carollo found that Santa Clara classifies townhomes as multi-family units. This is consistent with Santa Clara's 2009 Wastewater Rate Study.	Based Carollo classifi family i
Duplex	"Two-family premises" are combined with multi-family dwellings in San José's rate resolution. However, a duplex may be considered single family if it has two separate water meters.	Based on a sampling analysis, Carollo found that Santa Clara classifies duplexes as multi-family units. This is consistent with Santa Clara's 2009 Wastewater Rate Study.	Based Carollo classifi units.
Assisted Living	Carollo found no indication that this category is associated with a residential dwelling unit type (it is considered non-residential)	Based on Santa Clara's billing database, assisted living facilities are classified as multi-family dwellings in the wastewater database. This includes the following NAICS codes: 623210 and 623312.	Carollo this ca resider consid
Rooming, Boarding Houses, Dormitories	Carollo found no indication that this category is associated with a residential dwelling unit type (it is considered non-residential)	Based on Santa Clara's billing database, boarding units are classified as multi-family dwellings in the wastewater database. This includes the NAICS codes 721310.	Carollo this ca resider consid

### 3.0 RESIDENTIAL LOAD CONSIDERATIONS

San José, Santa Clara, and the Tributary Agencies use consistent concentrations for residential BOD, TSS, and NH<sub>3</sub> discharges. Because the Agencies use different assumptions about the number of persons/dwelling unit and per-capita consumption, the calculated total loading (lbs/month or lbs/year) from each residential household is different as show in Table 2.18. Despite these differences, the Agencies are using concentrations (mg/L) that are consistent with industry practices. Without actual residential monitoring, using consistent concentrations (mg/L) is a defensible and reasonable approach. Therefore, no changes to residential strength assumptions are recommended at this time.

Table 2.18 Comparison of Residential Wastewater Strength Assumptions Used in the Revenue Program Phase 2 Flow and Load Study City of San José							
	Flow gpd/ Capita	BOD		TSS		NH <sub>3</sub>	
		mg/L	Lbs/ capita/ month <sup>2</sup>	mg/L	Lbs/ capita/ month <sup>2</sup>	mg/L	Lbs/ capita/ month <sup>2</sup>
Single-Family							
All Agencies Except WVSD	65	250	4.13	250	4.13	35	0.58
WVSD	70	250	4.44	250	4.44	35	0.62
Multi-Family							
All Agencies Except WVSD	60	250	3.81	250	3.81	35	0.53
WVSD	65	250	4.13	250	4.13	35	0.58
Mobile Home							
All Agencies Except WVSD	65	250	4.12	250	4.12	35	0.58
WVSD	65	250	4.12	250	4.12	35	0.58
Notes:							
(1) DU = Dwelling unit (aka households) per the 2013/14 Revenue Program.							

### 4.0 NON-RESIDENTIAL LOAD ASSUMPTIONS

Currently, the Agencies use Flow, BOD, TSS, and NH<sub>3</sub> to characterize non-residential wastewater strengths. The member agencies each employ their own set of loading assumptions. Often, these assumptions are not the same. In instances where there is no evidence to support these differences, it may more appropriate to rely on standard loading assumptions across customer types to complete the wastewater strength assessment. Carollo analyzes this alternative approach in Section 4.2.



## **4.1 Non-Residential Working Days**

The number of working days for certain non-residential classifications is used in the revenue program to convert the total volume of sewage in each billing cycle (based on consumption data) to peak flow rate that is used for allocating capital costs in the Revenue Program. Carollo reviewed the working days assumptions used in the revenue program and found that the Agencies generally use a consistent set of assumptions that are based on common industrial workweek classifications:

- 261 Days: 5-Day workweek.
- 253 Days: 5-Day workweek with the most common 8 holidays off.
- 286 Days: 5-Day workweek with 1/2 day on Saturday.
- 278 Days: 5-Day workweek with 1/2 day on Saturday and the most common 8 holidays off.
- 313 Days: 6-Day workweek.
- 305 Days: 6-Day workweek with the most common 8 holidays off.
- 274 Days: "6/2" Schedule with 6 days on followed by 2 days off (more common in industrial practices).

Other specific schedules are applied on a per-household basis. Because the working day assumptions for a specific industrial classification may vary across cities and between businesses, it is valid for the Revenue Program to use a broad range of assumptions. Therefore, there are no specific recommendations for updating the working day assumptions in the Revenue Program.

## **4.2 Summary of Non-Residential Load Analysis**

As described in Section 4.0, each agency employs its own set of loading assumptions for BOD, TSS, and NH<sub>3</sub> per non-residential customer type. These non-residential customers do not include monitored customers whose wastewater is actually measured. The other non-residential customers fall within Standard Industry Classification (SIC) Codes. In many cases, the loading assumptions are similar or identical for SIC codes in the Agencies. However, Agencies have for select SIC codes, employed loading assumptions that are different, believing that their customers actual load values deviate from the rest of the county's. These differences can lead to a disparity between how different customers, with similar actual load values, in the same SIC code, are charged by different agencies. Table 2.19 shows a sampling of BOD loading assumptions for a few SIC codes across each agency. The sampling of BOD loading assumptions listed in Table 2.19 illustrates the fact that the Agencies occasionally, but not always, employ different loading assumptions.

<b>Table 2.19 Examples of Current Agency BOD Load Assumptions<sup>2</sup></b> <b>Phase 2 Flow and Load Study</b> <b>City of San José</b>								
SIC Code	SIC Description	Burbank	CSD 2-3	CuSD	Milpitas	San José	Santa Clara	WVSD
2600	Paper and allied products					550	1,250	
2700	Printing and publishing			250		250		250
2800	Chemicals and allied products					130	360	
5812	Eating places	1,250	1,250	1,250	1,250	1,042		1,250
7011	Hotels and motels		310	405	310	310		310
7021	Rooming and boarding houses			250		310		
7200	Personal services				150		150	
7300	Business services	130	130	130		130	130	130

Where Agencies' loading assumptions differed, Carollo developed a single loading assumption for each SIC code in order to simplify the rate calculation process, and reduce the potential rate disparity between different customers from different agencies in the same SIC code. These values were derived from simple averages of the values from each agency. The proposed single BOD loading assumption updates are shown in Table 2.20 for the same set of SIC codes that were shown Table 2.19. A complete list of the current and proposed single value loading assumptions for all agencies is included in Appendix A.

<b>Table 2.20 Single BOD Loading Assumption per SIC</b> <b>Phase 2 Flow and Load Study</b> <b>City of San José</b>		
Single BOD Loading Assumption per SIC		
SIC Code	SIC Description	Proposed BOD mg/l
2600	Paper and allied products	900
2700	Printing and publishing	250
2800	Chemicals and allied products	245
5812	Eating places	1215
7011	Hotels and motels	329
7021	Rooming and boarding houses	280
7200	Personal services	150
7300	Business services	130

<sup>2</sup> Full listings of agency loadings assumptions in Appendix A



One of the goals in developing the single SIC code loading assumption across all agencies was to have values that would preserve county-wide revenue neutrality, and also revenue neutrality for each individual Agency. In order to test whether revenue neutrality results from the single SIC code, Carollo compared the two revenue estimates for each SIC code for each Agency. One set of estimates was based on current loading assumptions used by each Agency. The second set of estimates was based on proposed single values for each SIC code, applied uniformly across Agencies. Table 2.21 presents the shifts in Agency revenue produced by the proposed loading assumptions.

<b>Table 2.21    Impact of Standardizing Countywide Non-residential Loading Assumptions Phase 2 Flow and Load Study City of San José</b>					
<b>Agency</b>	<b>Current</b>	<b>% Share</b>	<b>Proposed</b>	<b>% Share</b>	<b>Change in % Share</b>
Burbank	\$8,046	0.05%	\$8,006	0.05%	0.00%
CSD 2-3	35,591	0.23%	35,868	0.23%	0.00%
CuSD	1,034,398	6.76%	1,023,872	6.67%	-0.09%
Milpitas	1,391,443	9.09%	1,395,183	9.09%	-0.01%
San José	8,848,846	57.81%	8,898,703	57.94%	0.13%
Santa Clara	2,624,086	17.14%	2,627,020	17.10%	-0.04%
West Valley	1,364,344	8.91%	1,369,603	8.91%	-0.00%
<b>Total</b>	<b>\$15,306,755</b>		<b>\$15,358,255</b>		

As illustrated in Table 2.21, in aggregate, by implementing common loading assumptions across Agencies there is no shift in cost allocation between the respective Agencies. However, doing so would create a shift on an individual customer basis. Consequently, while Carollo believes that common loading assumptions across agencies would be beneficial, it should be implemented at the time that a sampling study is undertaken.

## 5.0 WINTER VERSUS ANNUAL NON-RESIDENTIAL FLOW ASSUMPTIONS

San José, Santa Clara, and the Tributary Agencies determine sewage flow from non-residential customers based on water consumption and, in some cases, a Return to Sewer Percentage is applied so that customers are billed a percentage of their metered water use. Specific methodologies for determining sewer flows from non-residential customers are as follows<sup>3</sup>:

- San José: Sewage flow is based on **winter** consumption data and a Return to Sewer Percentage is applied to approximately 164 non-residential customers over a variety of commercial types. Winter consumption data is defined as January, February, and

<sup>3</sup> Some exceptions may apply to specific "monitored" non-residential customers.



March in the annual Sanitary Sewer Service and Use Charges Resolution. Most reductions are applied to institutional classifications (schools, colleges, etc), medical centers, business parks, and (to a lesser extent) restaurants, hotels, motels, and boarding facilities. Return to Sewer Percentages range from 2 percent to 99 percent.

- Santa Clara: Sewage flow is based on **annual** water use and a Return to Sewer Percentage is applied to all non-residential classifications ranging from 70 percent to 90 percent. Schools are set at 24 percent and churches are set at 35 percent of meter water use to account for potential outdoor irrigation.
- WVSD: Sewage flow is based on **annual** water use. Winter consumption data and a Return to Sewer Percentage ranging from 40 to 99 is applied to approximately 158 non-residential customers over a variety of commercial types. In special circumstances, fixed consumption data is applied to approximately 33 non-residential customers.
- Burbank, CSD 2-3, and CuSD estimate non-residential sewage flows based on **annual** consumption data. For some non-residential customers, a Return to Sewer Percentage of 50 percent to 90 percent is applied. These factors are determined on an individual basis. For a few cases, parks for example, only 10 percent of the water use is assumed to return to the sewer. Newer developments install irrigation meters to separate exterior usage from indoor usage. In these cases, 100 percent of the metered indoor water usage is assumed returned to the sewer.
- Milpitas: Sewage flow is based on **annual** water use. Percent reduction factors are applied to only a handful of non-residential customers.

## **5.1 Winter Versus Annual Non-Residential Analysis**

For non-residential water consumption, a comparison was made between estimated sewer flow based on 1) annual water consumption using Return to Sewer Percentages; and 2) the annualized winter water consumption without the application of the Return to Sewer Percentages.

### **5.1.1 Data Sources**

Water consumption data was obtained from the San Jose Water Company, San Jose Muni Water, the City of Santa Clara, and the City of Milpitas. For the San Jose Water Company, non-residential water consumption data from January 2012 to March 2014 was available. For San Jose Muni Water, non-residential water consumption data from July 2006 to April 2014 was available. For the City of Santa Clara, water consumption data for the months of January, February, and March from 2005 to 2014 was available. For the City of Milpitas, water consumption data from January 2005 to June 2014 was available.

Other information used in this study includes the non-residential water service points obtained from both the San Jose Water Company and San Jose Muni Water. A sewer bill code report from the City of Santa Clara and water diversion rates for certain non-



residential water users obtained from the City of Milpitas were also used. The datasets all contain reduction factors that are used to indicate how much of the water usage is estimated to return to the sewers.

#### **5.1.2 Sewer Flows based on Annual Water Consumption**

Estimating sewer flows based on annual water consumption involved calculating estimated annual water consumption, with the application of the Return to Sewer Percentages. With the exception of the City of Santa Clara, the annual water consumption was estimated based on consumption data from January to December (all year).

For the City of Milpitas, non-residential water users were assigned Return to Sewer Percentages based on the information provided by the City of Milpitas. Approximately ten non-residential accounts had Return to Sewer Percentages assigned to them. The values ranged from 21 percent to 77 percent. It was assumed that the remaining non-residential accounts had a Return to Sewer Percentage of 100 percent.

For each non-residential account, using data from January to December, an average per day flow rate, which incorporates the Return to Sewer Percentages, was calculated per year. These per day flow rates were then multiplied by 365 days to obtain a yearly consumption, in million gallons (MG) of water. The estimated annual water consumption with the Return to Sewer Percentages is the sum of the estimated annual water consumption of all the non-residential water accounts. The City of Milpitas provided water consumption data from 2006 to 2013. The results are presented in Table 2.22.

For the City of San José, data was available from both the San Jose Water Company and San Jose Muni Water. Calculations were based on San Jose Muni Water consumption data from 2007 to 2013 and San Jose Water Company water consumption data from 2012 to 2013. The non-residential water consumption data was linked to the non-residential water service points to obtain the premise type as well as the corresponding Return to Sewer Percentage. The Return to Sewer Percentages ranged from approximately 1% to 100%. Any water consumption data not linking to a premise type and/or not having information regarding a Return to Sewer Percentage was excluded from the analysis.

Once the Return to Sewer Percentages were assigned, for each non-residential account, using data from January to December, an average per day flow rate, which incorporates the Return to Sewer Percentages, was calculated per year. These per day flow rates were then multiplied by 365 days to obtain a yearly consumption in million gallons (MG) of water. For each Agency, Table 2.22 presents the sum of estimated annual water consumption (including Return to Sewer Percentages) of all non-residential water accounts.

<b>Table 2.22</b>	<b>Estimated Annual Consumption (MG) with Return to Sewer Percentages Phase 2 Flow and Load Study City of San José</b>
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	City of Milpitas	City of San José <sup>(1)</sup>	City of Santa Clara
2006	1,960		
2007	1,641	849	
2008	1,699	881	
2009	1,401	860	
2010	1,412	839	
2011	1,445	843	2,504
2012	1,436	5,518	2,853
2013	1,575	5,525	2,774
Note: (1) 2007-11 includes only San Jose Muni Water data, while 2012 and 2013 include San Jose Water Company data as well.			

For the City of Santa Clara, the estimated annual water consumption was not calculated based on water consumption data. Instead, the estimated annual water consumption for the different years was obtained from the Revenue Program. Santa Clara's annual water consumption in the Revenue program is based on annual water use data with the application of a Return to Sewer Percentage applied to non-residential classifications. The Return to Sewer Percentage ranges from 70 to 90 percent.

### 5.1.3 Sewer Flows based on Annualized Winter Water Consumption

Sewer flows were estimated based on annualized winter water consumption by extrapolating annual water consumption from winter water consumption without the application of the Return to Sewer Percentages. Winter water consumption was defined as water consumed during January to March.

For the City of Milpitas, the annualized winter water consumption did not apply any Return to Sewer Percentages. The average per day flow rate for each non-residential account was calculated based on data from January to March, without incorporating any Return to Sewer Percentages. These per day flow rates were then multiplied by 365 days to obtain a yearly consumption, measured in million gallons (MG) of water. The annualized winter water consumption without the Return to Sewer Percentages is the sum of the annualized winter water consumption, without the application of the Return to Sewer Percentages, of all the non-residential water accounts. The City of Milpitas provided water consumption data from 2006 to 2013. The results are presented in Table 2.23.

For the City of San José, the annualized winter water consumption did not apply any Return to Sewer Percentages. Data was available from both the San Jose Water Company and San Jose Muni Water. Calculations were based on San Jose Muni Water consumption data from 2007 to 2013 and San Jose Water Company water consumption data from 2012 to 2013. For each non-residential account, using data from January to March, an average per day flow rate, which did not incorporate any Return to Sewer Percentages, was calculated per year. These per day flow rates were then multiplied by 365 days to obtain a yearly



consumption, in million gallons (MG) of water. The annualized winter water consumption without the Return to Sewer Percentages is the sum of the annualized winter water consumption, without the application of the Return to Sewer Percentages, of all the non-residential water accounts. The results are presented in Table 2.23.

For the City of Santa Clara, the annualized winter water consumption did not apply any Return to Sewer Percentages. The average per day flow rate for each non-residential account was calculated based on data from January to March without incorporating any Return to Sewer Percentages. These per day flow rates were then multiplied by 365 days to obtain a yearly consumption, measured in million gallons (MG) of water. The annualized winter water consumption without the Return to Sewer Percentages is the sum of the annualized winter water consumption, without the application of the Return to Sewer Percentages, of all the non-residential water accounts. The City of Santa Clara provided water consumption data from 2011 to 2013 to produce the results presented in Table 2.23.

<b>Table 2.23    Estimated Annualized Winter Consumption (MG) without Return to Sewer Percentages Phase 2 Flow and Load Study City of San José</b>			
	<b>City of Milpitas</b>	<b>City of San José</b>	<b>City of Santa Clara</b>
2006	452		
2007	1,204	696	
2008	1,223	684	
2009	1,057	692	
2010	1,139	633	
2011	957	678	2,530
2012	1,143	3,944	2,491
2013	1,026	4,378	2,492

## **5.2    Winter Versus Annual Summary of Findings**

The results show that in terms of non-residential water consumption, using annual water consumption data to estimate sewer discharges produces a higher water consumption estimate when compared to using annualized winter consumption data. The difference was found to be about 20 to 30 percent for San José and Milpitas, and about 10 to 15 percent for Santa Clara.

For the City of Milpitas, using annual consumption data (with Return to Sewer Percentages) was approximately 27 percent higher, based on the years from 2007 to 2013, than the annualized winter consumption data without the application of Return to Sewer Percentages. The year 2006 was not factored into this percentage since the water consumption during this year was relatively low and did not seem to be representative of typical non-residential water consumption.

For the City of San José, using annual consumption data (with Return to Sewer Percentages) was approximately 22 percent higher than using annualized winter consumption data, based on the years from 2007 to 2013. The years 2012 and 2013 had significantly higher water consumption when compared to previous years but this is because starting in 2012, water consumption data was available for both San Jose Muni and the San Jose Water Company. Before 2012, only San Jose Muni Water consumption data was available.

For the City of Santa Clara, the estimated annual consumption with the application of Return to Sewer Percentages was approximately 11 percent higher, based on the years from 2011 to 2013, than the annualized winter consumption data without the application of Return to Sewer Percentages. Santa Clara applies aggressive reduction factors to its non-residential customers (relative to the other Tributary Agencies) and this is likely the cause of the smaller difference. For example, all non-residential customers are reduced by at least 90% if there is no separate irrigation meter. Therefore, Santa Clara was considered unique and, across the region, a difference of about 20 to 30 percent between the two non-residential sewer flow methodologies is more representative of the RWF Agencies.

## **6.0 NON-RESIDENTIAL CLASSIFICATIONS**

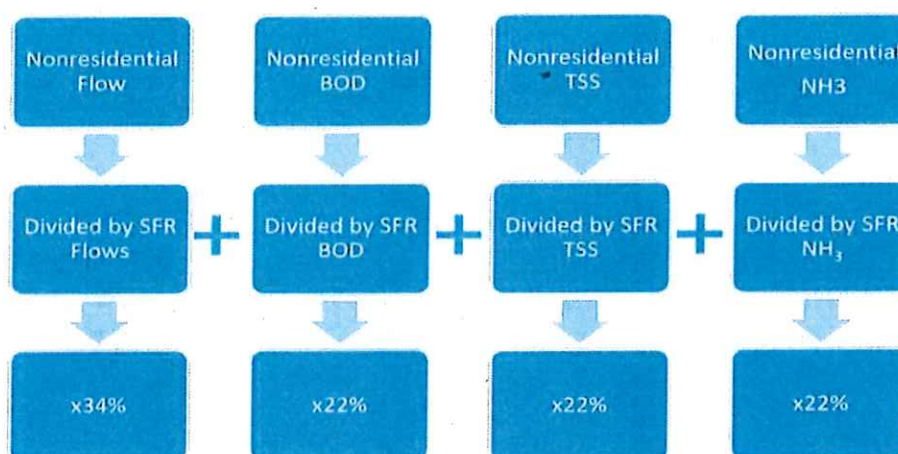
Between Agencies, there is variability in the assumed wastewater loading coming from a single class of non-residential customers. This variability was previously discussed in Section 4.2. There can be benefit in standardizing assumed loads when no Agency can show that their assumed customer class wastewater loads are significantly different the other Agencies. As Table 2.21 indicated, this method did not preserve revenue neutrality.



This section describes the potential benefit of classifying non-residential customers into groups based on common strength ratios. It will also describe the impact of this grouping method on agency cost allocation.

In order to simplify the administrative process while maintaining consistency in agency cost allocation, non-residential customer types can be grouped based on their respective Equivalent Residential Units (ERU). An ERU is the measure of customer's impact on the wastewater system as a ratio to the impact of a typical single-family residence. The ERU takes into account weighting factors such as the customer's flow, BOD, TSS, and  $\text{NH}_3$  loadings. The ERU calculation process is presented in Figure 2.4.

Figure 2.4 ERU Calculation Process



The customer component inputs are represented in the top row of Figure 1.4. The second row represents the amount of flow, BOD, TSS, and  $\text{NH}_3$  contributed by a single-family residence. The percentage factors in the bottom row represent the standard component weighting values. These weighting values are based on the assumed allocation of O&M and replacement capital costs from the treatment and collection facilities. An example of an ERU calculation is presented in Table 2.24.

Table 2.24 Example ERU Calculation Phase 2 Flow and Load Study City of San José			
Customer Flow 300 gpd	Customer BOD 550 mg/L	Customer TSS 450 mg/L	Customer $\text{NH}_3$ 80 mg/L
300 divided by 200 (typical SFR flow) x34%	550 divided by 250 (typical SFR BOD) x22%	450 divided by 250 (typical SFR TSS) x22%	80 divided by 35 (typical SFR $\text{NH}_3$ ) x22%
Flow factor = .51	BOD factor = .48	TSS factor = .40	$\text{NH}_3$ factor = .50
Sum of component factors = Customer's ERU value = 1.89 ERUs			

Once every customer's ERU factor is calculated, they are sorted and grouped based on a set of ERU per unit ranges. These ranges put customers with similar impacts on the wastewater system within the same group. Once grouped, each customer is assigned a strength factor derived from the average ERU per unit factor of the whole group. This assigned ERU/unit value replaces the customer's calculated ERU/unit value. This value is used to calculate the cost associated with each customer's discharge and the total cost for each city. While the ERU/unit value still needs to be calculated for each customer, the assigned value simplifies the agency cost calculations because it reduces the number of non-residential customer categories. Each group's range and assigned ERU per unit value are presented in Table 2.25.

<b>Table 2.25    Strength Groupings</b> <b>Phase 2 Flow and Load Study</b> <b>City of San José</b>	
<b>Strength Groupings</b>	
<b>ERU/unit Range</b>	<b>Assigned ERU/unit value</b>
0<A<=1	0.6
1<B<=4	2.2
4<C<=7	5
7<D<=15	11
15<E<=30	20
30<F<=100	40
100<G	300

Table 2.26 presents the shifts in member agency cost allocation produce by applying the proposed grouping ranges. The right-hand column indicates that, for the most part, revenue neutrality is preserved using the grouping methodology.

<b>Table 2.26    Impact of Grouping on Agency Cost Allocation</b> <b>Phase 2 Flow and Load Study</b> <b>City of San José</b>					
<b>Agency</b>	<b>Current Allocation</b>		<b>Allocation with Grouping</b>		<b>Change in %</b>
	<b>Total Share</b>	<b>% Share</b>	<b>Total Share</b>	<b>% Share</b>	
Burbank	\$8,046	0.05%	\$6,956	0.05%	-0.01%
CSD 2-3	35,591	0.23%	36,539	0.24%	0.01%
CuSD	1,034,398	6.76%	934,611	6.10%	-0.66%
Milpitas	1,391,443	9.09%	1,437,309	9.38%	0.29%
San José	8,848,846	57.81%	8,809,259	57.48%	-0.33%
Santa Clara	2,624,086	17.14%	2,649,849	17.29%	0.15%
West Valley	1,364,344	8.91%	1,450,652	9.47%	0.55%
<b>Total</b>	<b>\$15,306,755</b>		<b>\$15,325,175</b>		



The method of grouping customers by ERU factors both simplifies the administrative process and maintains consistency in agency cost allocation. Carollo recommends that the member agencies implement the proposed grouping methodology.

## 7.0 MASS BALANCE

A mass balance can be performed in order to evaluate the reasonableness of the current customer data assumptions for flow, BOD, TSS, and  $\text{NH}_3$  relative to measured influent at the plant, as well as the assumptions for proposed changes to these components.

The mass balance compares the measured flow, BOD, TSS, and  $\text{NH}_3$  entering the plant to the calculated values that result from the current rate calculation process, as well as the calculated values from the proposed alternatives.

The results of the mass balance are presented in Table 2.27. The first row of the table shows the measured values for flow, BOD, TSS, and  $\text{NH}_3$  at the plant. The second row in the table shows the calculated values based on the flow and loading assumptions used in the current revenue plan. Subsequent rows show the calculated flow and load values for the various alternatives that are presented in this TM.

<b>Table 2.27    Mass Balance Phase 2 Flow and Load Study City of San José</b>				
<b>Mass Balance</b>	<b>Flow (mgd)</b>	<b>BOD (lbs/day)</b>	<b>TSS (lbs/day)</b>	<b><math>\text{NH}_3</math> (lbs/day)</b>
Influent Plant Loading	113 <sup>(1)</sup>	273,302 <sup>(2)</sup>	260,579 <sup>(2)</sup>	29,347 <sup>(2)</sup>
Current Calculated Total	115	192,782	181,459	24,553
Calculated Total with Proposed Groupings	115	192,806	181,473	24,554
Calculated Total with Proposed Residential Assumptions	114	192,782	181,459	24,553
Calculated Total with Proposed Residential Assumptions and Non-residential Groupings	114	192,806	181,473	24,554
<b>Notes:</b> (1) Based on the latest (2013) Report to TPAC on November 6th, 2013. Based on peak dry weather flow that occurred from September 16th - 20th, 2013. (2) Based on influent plant monitoring data from September 16th - 20th, 2013.				

Several conclusions can be reached from comparing the different rows in the table.

- The flow values for the current revenue plan as well as all of the alternatives roughly approximate the amount of flow that enters the plant on an aggregate basis.
- The loading values for the current revenue plan understate the amount of BOD, TSS, and  $\text{NH}_3$  entering the plant.

- Each of the alternatives presented in this TM present calculated flow, BOD, TSS, and NH<sub>3</sub> values that are almost equal to the values used in the current revenue plan.

Based on these conclusions, the alternatives and their respective flow and loading assumptions are consistent with the current revenue plan. In order to improve the accuracy of the alternatives in relation to the loads measured at the plant, a load sampling evaluation should be undertaken. Such an effort would take several years to complete and could still likely result in a measured versus calculated loads discrepancy of somewhere in the 5 to 15 percent range.

## **8.0 SUMMARY AND RECOMMENDATIONS**

The following sections summarize Carollo's major conclusions and recommendations.

### **8.1 Residential Flow Assumptions**

Residential flow assumptions have not been updated since 1975. Based on the findings of this study and prior studies, the current revenue program residential flow assumptions do not reflect current usage characteristics on an agency by agency basis. Carollo recommends updating these assumptions using a unique flow assumption per household for each Agency and customer classification. The merits of this approach were weighed against several alternatives and discussed at a TAC Workshop on October 1, 2014. This methodology was found to be the most accurate and equitable. Based on this finding, detailed flow assumptions are provided based on winter water consumption data for Santa Clara, Milpitas, San José, and WVSD. However, because CSD 2-3, CuSD, and Burbank did not provide consumption data, Carollo recommends that they use a weighted average flow until consumption data can be used to determine their unique discharges.

To create a unique set of flow assumption for each Agency, Carollo evaluated almost 650,000 consumption records to estimate sewer flows. Winter data was used to estimate sewer flows and Carollo's review of Return to Sewer Percentages shows that this is an industry-accepted approach and relevant to the RWF service area. However, a 400 GPD cap was used to eliminate outliers associated with outdoor irrigation (even in the winter), data integrity issues, as well as issues with linking the number of multi-family and mobile home accounts to the associated water consumption records. The result of this work is an approach that is equitable and defensible and provides the best representation of sewer flows. It also uses a methodology that is simple to update based on future census data and consumption records.

### **8.2 Residential Strength Parameters**

Without actual residential monitoring of residential wastewater strength, following the standard industry practice of assuming consistent concentrations is a defensible and



reasonable approach. Therefore, no changes to residential strength assumptions are recommended at this time.

However, because the mass balance resulted in inconsistent loadings at the plant relative to the Revenue Program, it is recommended that the Tributary Agencies conduct a wastewater strength-sampling program. It is unknown whether the cause of the discrepancy is due to residential or non-residential loading assumptions. A residential strength-sampling program should be commissioned first to see if the residential parameters are accurate. A residential sampling program will be easier to implement than one for non-residential customers.

### **8.3 Non-Residential Flow Analysis**

There is no universal industry standard for estimating sewage flows across broad ranges of commercial and industrial classifications. Based on Carollo's experience, winter water usage with a reduction factor, if applicable, is a common approach. It is reasonable that flows from the various non-residential dischargers within the RWF service area will vary (even those with the same SIC designation). However, the methods for calculating those flows for the purposes of allocating costs in the Revenue Program should be consistent.

The major discrepancy among the RWF users is that San José uses winter consumption data to bill non-residential customers, while the City of Santa Clara and the other Tributary Agencies use annual water use with a Return to Sewer Percentage. This study investigated the potential differences caused by these two methods. The results show that using annual water consumption data to estimate sewer discharges produces about 20-30% more sewer flow when compared to using annualized winter consumption data.

Without substantial flow monitoring data, it is not possible to definitively determine which approach is more accurate. Because both approaches are reasonable, it is Carollo's opinion that the decision to use winter vs. annual billing data should be left to each Agency's judgment based on their unique characteristics, customer base, metering capabilities, and data collection abilities.

### **8.4 Non-Residential Strength Parameters**

This study found that not all Agencies use the same non-residential loading assumption for all SIC codes. Although many of the SIC loading assumptions are the same, the study found some discrepancies. Single loading assumptions per SIC code would preserve overall revenue neutrality as well as equity amongst the Agencies. If the Agencies wish to maintain the current policy whereby Agencies have occasionally reported their own loading assumptions to represent specific SIC codes, we suggest performing a sampling program, for the different SIC codes, where none has been recently performed, in order to develop defensible loading assumptions. As described in Section 4.2, standardizing non-residential customer loading assumptions results in a system that preserves revenue neutrality.



Carollo does recommend that the member agencies implement the single value loading assumptions for non-residential customer types once a sampling study is completed.

Additionally, the method described in Section 6.0 of grouping customers by ERU factors both simplifies the administrative process and maintains consistency in agency cost allocation. Using categories that place commercial customers into common wastewater strength ranges may be a more realistic approach as it recognizes that the specific wastewater parameters of each SIC code is not known and is difficult to quantify. Carollo recommends that the Agencies implement the proposed grouping methodology. However, because the current approach is valid and the current parameters align with the State Revenue Program Guidelines, the ERU cost factor methodology should only be considered if the Tributary Agencies agree that the simplified methodology outweighs any administrative burden associated with its implementation.

## **8.5 Mass Balance Analysis**

A mass balance was performed in order to evaluate the reasonableness of the current customer data assumptions for flow, BOD, TSS, and  $\text{NH}_3$  relative to measured influent at the plant. It was also conducted to test how proposed changes (identified by this study) would change the mass balance relative to the current revenue program.

The study found that flow values for the current revenue program roughly approximates the amount of flow that enters the plant, but understates the amount of BOD, TSS, and  $\text{NH}_3$  entering the plant. Because the mass balance resulted in inconsistent loadings at the plant relative to the Revenue Program, it may be necessary to conduct a wastewater strength-sampling program. It is unknown whether the cause of the discrepancy is due to residential or non-residential loading assumptions. A residential strength-sampling program should be commissioned first to see if the residential parameters are accurate.

Furthermore, the study tested how proposed changes would change the mass balance relative to the current revenue program, and found no inconsistencies. This includes the recommended residential flow assumptions and the non-residential "ERU groupings" described in Section 6.0.

## **9.0 REVENUE PROGRAM UPDATES**

Overall, it is recommended that San José-Santa Clara evaluate the Revenue Program assumptions every 10 years to ensure accuracy and equity. This may include a combination of updating the household densities used to estimate residential sewer flows based on the latest census information and review of water consumption data. It may also include updating residential and non-residential wastewater strength parameters based on more current loadings data.



## APPENDIX A - PRELIMINARY FLOW ANALYSIS

## APPENDIX A – COMPARISON OF NON-RESIDENTIAL WASTEWATER STRENGTH

BOD Assumptions used in the Revenue Program (mg/L)

SIC Code	Description	Burbank	CSD 2-3	CuSD	Milpitas	San José	Santa Clara	WVSD	Proposed Countywide Assumptions
1770	Concrete Work					130			130
2000	Food and Kindred Prod						1,120		1120
2011	Meat packing plants					415			415
2020	Dairy Prod					1,130			1130
2050	Bakery Prod					720			720
2084	Wines, brandy					1,870		1,870	1870
2086	Soft Drinks					1,030			1030
2600	Paper and Allied Prod					550	1,250		900
2700	Printing & Publishing			250		250		250	250
2800	Chemicals and Allied Prod					130	360		245
2851	Paints and Allied Prod					130			130
3400	Fabricated Metal Prod					10	10	10	10
3500	Industrial Machinery and Equipment			290		290	290	290	290
3600	Electronic Equipment			30		30	30	30	30
3800	Instruments and related						30		30
3900	Misc Manufacturing Prod					130			130
4225	General warehousing					150			150



SIC Code	Description	Burbank	CSD 2-3	CuSD	Milpitas	San José	Santa Clara	WVSD	Proposed Countywide Assumptions
4953	Refuse Systems					130			130
5261	Retail Nurseries					300			300
5411	Grocery Stores					475			475
5461	Retail bakeries					1,000			1000
5500	Automotive Dealer and Service					180	180		180
5541	Gas Service Station		180	180	180	180		180	180
5800	Eating and Drinking						1,250		1250
5812	Eating	1,250	1,250	1,250	1,250	1,042		1,250	1215
5813	Drinking					200			200
5900	Misc Retail					230			230
6000	Depository Institutions				130				130
6553	Cemetery Developers					150			150
7000	Hotels and other lodging						310		310
7011	Hotels and Motels		310	405	310	310		310	329
7021	Rooming and Boarding			250		310			280
7200	Personal Services				150		150		150
7211	Power Laundries		150	150		150		150	150
7216	Dry-cleaning plants					450			450
7218	Industrial Launderers							670	670
7231	Beauty Shops					150			150
7261	Funeral Services					800			800
7300	Business	130	130	130		130	130	130	130

SIC Code	Description	Burbank	CSD 2-3	CuSD	Milpitas	San José	Santa Clara	WVSD	Proposed Countywide Assumptions
	Services								
7384	Photofinishing Labs					150		160	155
7389	Other Business Services					3		3	3
7500	Auto repair Services						180		180
7521	Automobile Parking	180				130			155
7530	Automotive Repair Shops					180			180
7542	Carwashes			20		20		20	20
7549	Automotive Services					200			200
7832	Movie Theaters					190			190
7990	Misc Recreation		250			200			225
7996	Amusement Parks					130			130
7997	Sports & Clubs					150			150
7999	Other Amusement		180						180
8000	Health Services		180			190	230		200
8200	Educational Services	130		130	130		130	130	130
8211	Elementary and Secondary Schools					130			130
8220	Colleges and Universities					130			130
8300	Social Services		230	230	271	230		230	238
8661	Religious Organizations		250						250
8711	Architectural Services					130			130



**TSS Assumptions used in the Revenue Program (mg/L)**

<b>SIC CODE</b>	<b>Description</b>	<b>Burbank</b>	<b>CSD 2-3</b>	<b>CuSD</b>	<b>Milpitas</b>	<b>San José</b>	<b>Santa Clara</b>	<b>WVSD</b>	<b>Proposed Countywide Assumptions</b>
1770	Concrete Work					80			80
2000	Food and Kindred Prod						690		690
2011	Meat packing plants					233			233
2020	Dairy Prod					445			445
2050	Bakery Prod					400			400
2084	Wines, brandy					1,200		1,200	1200
2086	Soft Drinks					65			65
2600	Paper and Allied Prod					1,260	560		910
2700	Printing & Publishing			500		500		500	500
2800	Chemicals and Allied Prod					80	720		400
2851	Paints and Allied Prod					80			80
3400	Fabricated Metal Prod					60	60	60	60
3500	Industrial Machinery and Equipment			550		550	550	550	550
3600	Electronic Equipment			15		15	15	15	15
3800	Instruments and related						15		15
3900	Misc Manufacturing Prod					80			80
4225	General warehousing					150			150
4953	Refuse Systems					80			80
5261	Retail Nurseries					280			280

SIC CODE	Description	Burbank	CSD 2-3	CuSD	Milpitas	San José	Santa Clara	WVSD	Proposed Countywide Assumptions
5411	Grocery Stores					475			475
5461	Retail bakeries					600			600
5500	Automotive Dealer and Service					280	280		280
5541	Gas Service Station		280	280	280	280		280	280
5800	Eating and Drinking						560		560
5812	Eating	560	560	560	560	587		560	565
5813	Drinking					200			200
5900	Misc Retail					190			190
6000	Depository Institutions				80				80
6553	Cemetery Developers					150			150
7000	Hotels and other lodging						121		121
7011	Hotels and Motels		121	361	121	121		121	169
7021	Rooming and Boarding			250		121			186
7200	Personal Services				110		110		110
7211	Power Laundries		110	110		110		110	110
7216	Dry-cleaning plants					240			240
7218	Industrial Launderers							680	680
7231	Beauty Shops					150			150
7261	Funeral Services					800			800
7300	Business Services	80	80	80		80	80	80	80
7384	Photofinishing Labs					150		60	105
7389	Other					55		55	55



SIC CODE	Description	Burbank	CSD 2-3	CuSD	Milpitas	San José	Santa Clara	WVSD	Proposed Countywide Assumptions
	Business Services								
7500	Auto repair Services						280		280
7521	Automobile Parking	280				80			180
7530	Automotive Repair Shops					280			280
7542	Carwashes			150		150		150	150
7549	Automotive Services					1,350			1350
7832	Movie Theaters					210			210
7990	Misc Recreation		250			200			225
7996	Amusement Parks					80			80
7997	Sports & Clubs					150			150
7999	Other Amusement		280						280
8000	Health Services		250			90	85		142
8200	Educational Services	100		100	100		100	100	100
8211	Elementary and Secondary Schools					100			100
8220	Colleges and Universities					100			100
8300	Social Services		85	85	142	85		85	96
8661	Religious Organizations		250						250
8711	Architectural Services					80			80

**NH<sup>3</sup> Assumptions used in the Revenue Program (mg/L)**

<b>SIC CODE</b>	<b>Description</b>	<b>Burbank</b>	<b>CSD 2-3</b>	<b>CuSD</b>	<b>Milpitas</b>	<b>San José</b>	<b>Santa Clara</b>	<b>WVSD</b>	<b>Proposed Countywide Assumptions</b>
1770	Concrete Work					11			11
2000	Food and Kindred Prod						-		10
2011	Meat packing plants					2			7
2020	Dairy Prod					20			20
2050	Bakery Prod								20
2084	Wines, brandy					3		3	3
2086	Soft Drinks								11.5
2600	Paper and Allied Prod					7	10		9
2700	Printing & Publishing			-				-	11
2800	Chemicals and Allied Prod					11	-		11
2851	Paints and Allied Prod					11			11
3400	Fabricated Metal Prod					1	1	1	1
3500	Industrial Machinery and Equipment			-			-	-	5
3600	Electronic Equipment			30		30	15	30	26
3800	Instruments and related						15		15
3900	Misc Manufacturing Prod					11			11
4225	General warehousing					11			11
4953	Refuse Systems					11			11
5261	Retail Nurseries					11			11



SIC CODE	Description	Burbank	CSD 2-3	CuSD	Milpitas	San José	Santa Clara	WVSD	Proposed Countywide Assumptions
5411	Grocery Stores					11			11
5461	Retail bakeries					11			11
5500	Automotive Dealer and Service					11	11		11
5541	Gas Service Station		-	-	-			-	11
5800	Eating and Drinking						10		10
5812	Eating	10	10	10	10	11		10	10
5813	Drinking					11			11
5900	Misc Retail					11			11
6000	Depository Institutions				11				11
6553	Cemetery Developers					11			11
7000	Hotels and other lodging						7		7
7011	Hotels and Motels		7	21	7	7		7	10
7021	Rooming and Boarding			35		11			23
7200	Personal Services				5		5		5
7211	Power Laundries		5	5		5		5	5
7216	Dry-cleaning plants					11			11
7218	Industrial Launderers							2	2
7231	Beauty Shops					11			11
7261	Funeral Services					11			11
7300	Business Services	11	11	11		11	11	11	11
7384	Photofinishing Labs							-	11

7389	Other Business Services							-	11
7500	Auto repair Services						-		11
7521	Automobile Parking	-				11			11
7530	Automotive Repair Shops								11
7542	Carwashes			-				-	
7549	Automotive Services								11
7832	Movie Theaters					11			11
7990	Misc Recreation		35			11			23
7996	Amusement Parks					11			11
7997	Sports & Clubs					11			11
7999	Other Amusement		-						23
8000	Health Services		-			11	15		13
8200	Educational Services	30		30	30		30	30	30
8211	Elementary and Secondary Schools					30			30
8220	Colleges and Universities					30			30
8300	Social Services		15	15	13	15		15	15
8661	Religious Organizations		35						35
8711	Architectural Services					11			11



**APPENDIX B – 2014 FLOW AND LOADS STUDY –  
RESIDENTIAL FLOW ASSUMPTIONS ALTERNATIVES**

Agency	# of units	Current Assumptions			Alternative 1 Assumptions			Alternative 2 Assumptions			Alternative 3 Assumptions		
		gpcd	Cap/unit	gpd	gpcd	Cap/unit	gpd	gpcd	Cap/unit	gpd	gpcd	Cap/unit	gpd
SFR													
Milpitas	12,229	65	3.37	2,678,762	60	3.15	2,311,281	60	3.54	2,597,440	51	3.54	2,196,328
San José	181,039	65	3.37	39,656,593	60	3.15	34,216,371	60	3.34	36,280,216	60	3.34	36,280,216
Santa Clara	17,103	65	3.37	3,746,412	60	3.15	3,232,467	60	2.96	3,037,493	61	2.96	3,088,118
Burbank	946	65	3.37	207,221	60	3.15	178,794	60	2.76	156,658	60	2.76	156,658
CSD 2-3	4,545	65	3.37	995,582	60	3.15	859,005	60	3.63	989,901	60	3.63	989,901
CuSD	15,390	65	3.37	3,371,180	60	3.15	2,908,710	60	2.94	2,714,796	60	2.94	2,714,796
West Valley	31,496	70	2.63	5,798,414	60	3.15	5,952,744	60	2.74	5,177,942	68	2.74	5,868,335
SFR Subtotal				56,454,164			49,659,372			50,954,445			51,294,351
MFR													
Milpitas	7,143	60	2.05	878,589	60	2.37	1,015,735	60	2.73	1,168,994	55	2.73	1,072,521
San José	120,294	60	2.05	14,796,162	60	2.37	17,105,807	60	2.53	18,244,560	59	2.53	17,956,285
Santa Clara	28,998	60	2.05	3,566,754	60	2.37	4,123,516	60	2.26	3,928,669	72	2.26	4,718,555
Burbank	633	60	2.05	77,859	60	2.37	90,013	60	2.64	100,179	61	2.64	101,938



Agency		Current Assumptions			Alternative 1 Assumptions			Alternative 2 Assumptions			Alternative 3 Assumptions		
		60	2.05	14,022	60	2.37	16,211	60	3.29	22,484	61	3.29	22,879
CSD 2-3	114												
CuSD	5,366	60	2.05	660,018	60	2.37	763,045	60	2.47	794,541	61	2.47	808,495
West Valley	10,287	65	2.46	1,644,891	60	2.37	1,462,811	60	2.06	1,270,354	65	2.06	1,377,429
MFR Subtotal				21,638,295			24,577,137			25,529,781			26,058,103
MH	# of units	gpcd	Cap/unit	gpd	gpcd	Cap/unit	gpd	gpcd	Cap/unit	gpd	gpcd	Cap/unit	gpd
Milpitas	570	65	1.9	70,395	60	2.71	92,682	60	2.24	76,608	61	2.24	77,885
San José	10,801	65	1.9	1,333,924	60	2.71	1,756,243	60	2.97	1,924,738	60	2.97	1,924,738
Santa Clara	0	65	1.9	0	60	2.71	0	60	2.28	0		2.28	0
Burbank	0	65	1.9	0	60	2.71	0	60	0	0		0	0
CSD 2-3	0	65	1.9	0	60	2.71	0	60	2.73	0		2.73	0
CuSD	0	65	1.9	0	60	2.71	0	60	0	0		0	0
West Valley	483	65	2.41	75,662	60	2.71	78,536	60	1.78	51,584	66	1.78	56,743
MH Subtotal				1,479,980			1,927,460			2,052,931			2,059,366
Residential Total				79,572,440			76,163,969			78,537,156			79,411,820

October 2014

pw://Carollo/Documents/Client/CA/San Jose/9538A00/Deliverables/Flow Services Phase 2 TM.docx

# Memorandum

**TO:** HONORABLE MAYOR  
AND CITY COUNCIL

**FROM:** Kerrie Romanow

**SUBJECT:** SEE BELOW

**DATE:** October 27, 2014

Approved



Date

10/31/14

**SUBJECT: ODOR CONTROL STRATEGY FOR REGIONAL WASTEWATER FACILITY**

## RECOMMENDATION

Approve the proposed odor control strategy at the San José-Santa Clara Regional Wastewater Facility.

## OUTCOME

Approval of the proposed odor control strategy will enable the development of an odor control implementation plan which will identify the appropriate odor control options and technologies needed to meet the established odor goal at the RWF fence line and allow staff to implement the plan through the RWF capital improvement program.

## EXECUTIVE SUMMARY

Adopted at the end of 2013, the Plant Master Plan (PMP) detailed an extensive Capital Improvement Program (CIP) for the San José-Santa Clara Regional Wastewater Facility (RWF). Part of the PMP's strategic vision was for the RWF to be a good neighbor with respect to odor, noise, and aesthetics. In keeping with this vision, the PMP included preliminary recommendations for odor control facilities to be implemented at select stages of the treatment train. These high-level recommendations need to be followed up with a detailed odor control implementation plan (OIP) to clearly define the RWF's odor control needs and solutions.

In August 2014, the City contracted with CH2M HILL Engineers (Consultant) to prepare a RWF odor and corrosion control study (Study). The main elements of this Study are:

- Validate the odor goal assumed in the PMP.
- Establish the RWF odor fence line at which the odor goal is to be met.
- Develop an OIP.



The OIP will entail 1) sampling and modeling, 2) establishing design criteria and technology options, and 3) developing an implementation schedule and budget. Once the appropriate odor control measures have been selected, the City will implement them as part of multiple CIP projects, followed up by additional sampling and modeling to verify the overall RWF odor profile is being modified as expected, and adjustments to the odor control facilities, if necessary.

If approved by the Council, the proposed odor control strategy will enable the development of an OIP, which will identify appropriate odor control facilities for staff to implement at the RWF through the CIP.

## **BACKGROUND**

The PMP for the San José-Santa Clara Regional Wastewater Facility<sup>1</sup> (RWF), detailing an extensive CIP for the next 30 years, was adopted by the San José City Council in November 2013 and the Santa Clara City Council in December 2013. Part of the PMP's strategic vision was for the RWF to be a good neighbor with respect to odor, noise, and aesthetics. In response to this strategic vision, the PMP included preliminary recommendations for odor control facilities to be implemented at select stages of the treatment train. Odor control constituted approximately \$78 million of the \$2.1 billion 30-year capital program. For more detail, see PMP Project Memoranda Nos. 5.5 and 6.1 (2011). The project validation process, completed in February 2014, estimated about \$77 million in odor control improvements in the ten year capital plan.

Since the RWF was considered to be one of multiple odor sources in the area, the PMP recommended establishing a Regional Odor Assessment Program (ROAP). Initial efforts by the RWF on forming the ROAP included comprehensive RWF sampling, done by CH2M HILL Engineers, and development of a preliminary model that utilizes these data. Subsequently, however, other participants in the ROAP withdrew from the effort and the ROAP was never completed and this was communicated to the Transportation and Environment Committee in October 2012.

[http://www3.sanjoseca.gov/clerk/CommitteeAgenda/TE/20121001/TE20121001\\_b1.PDF](http://www3.sanjoseca.gov/clerk/CommitteeAgenda/TE/20121001/TE20121001_b1.PDF)

The RWF wastewater treatment process includes liquids and solids that emit different types of odors. The reduction and control of odors can be achieved through construction of physical components such as covers, conduits, and fans or through a variety of biological, physical or chemical odor treatment process. Based on the type of odorants, a combination of measures as well as multiple stages of treatment may be required to remove the odorants to the desired fence line level.

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<sup>1</sup> \*The legal, official name of the facility remains San Jose/Santa Clara Water Pollution Control Plant, but beginning in early 2013, the facility was approved to use a new common name, the San José-Santa Clara Regional Wastewater Facility.

## **ANALYSIS**

The PMP made recommendations for odor control facilities to be implemented for select unit processes in the treatment train. These recommendations were based on a preliminary assessment of the effectiveness of these facilities, engineering feasibility, cost, and land-use requirements. The PMP is a high-level planning document and a detailed OIP is needed to clearly define the RWF's odor control needs and solutions.

### **Odor and Corrosion Control Study**

On August 27, 2014, the City contracted with the Consultant to prepare a RWF odor and corrosion control study (Study). The Study includes completion of the sampling work they had done through the ROAP and development of a comprehensive OIP. The Study also includes recommendations for corrosion control as it relates to odor. Since the corrosion component of the Study is minor and is only considered in context of odor, this staff report will focus on the odor components of this work effort. However corrosion considerations will be included in all recommended odor control measures.

The main elements of this Study are:

- Validate the odor goal assumed in the PMP
- Establish the RWF odor fence line at which the odor goal is to be met
- Develop an OIP

### **Odor Goal**

The industry-accepted unit of measurement for odorous air is dilution-to-threshold (D/T). It is a measurement based on a detection threshold concept, and describes the composite effect of all the odorants present. It is defined as the number of volumes of fresh air required to dilute an odorous air sample to where 50 percent of the population will not detect it. A D/T is assigned to an odorous air source by collecting a sample and shipping it to a dedicated laboratory where a carefully selected panel of individuals each use an instrument that progressively dilutes the sample with odor-less air until no odor is detected. The responses are compiled to ascertain the D/T at which 50 percent of the panel no longer detects the odor. The lower the D/T number, the lower the strength of the odor.

The PMP-recommended odorous air treatment facilities were sized to not exceed 5 D/T at the RWF operational area periphery. A goal of 5 D/T is common in the public wastewater industry, and matches the Bay Area Air Quality Management District's (BAAQMD) Regulation 7 that deals with nuisance odor impacts.

It is important to note that, while 5 D/T does not suggest "no odor" at the fence line, it is a very low odor threshold. The lower the selected odor goal, the more extensive the odor treatment facilities need to be, and the higher the cost. Industry-wide it has been observed that, while the



cost for providing odor treatment increases as the odor goal decreases to around 5 D/T, it increases exponentially as the odor goal drops below 5 D/T. Staff is recommending that the RWF CIP continue to use the 5 D/T odor goal that was established in the PMP. 5 D/T has successfully been used as a goal throughout the Bay Area, as well as nationally, to reduce community odor impacts.

### **Proposed Odor Fence Line**

The moment odorous air is released it is blended and diluted with surrounding air. This dilution is greatly influenced by prevailing wind strength and direction, and the surrounding topography. Typically, undulating topography and the presence of tall buildings impede dilution of the odorous air. These structures tend to concentrate the odors and/or channel the odor stream through the gaps in buildings, making it easier to detect further from the source. Sizing appropriate odor-control treatment facilities requires estimating the not-to-exceed odor level at the odor emission site, stack, or exhaust point, so that a pre-determined odor goal at a set distance from the odor source, i.e., odor fence line, is not exceeded.

Thus, in addition to establishing the appropriate odor goal for the RWF, the specific odor fence line for this odor goal needs to be defined. The odor fence line selection directly influences the cost of the required odor treatment facilities, i.e., the closer the odor fence line to the RWF's odor sources, the more extensive the required treatment facilities.

The RWF property line is shown in Attachment A. Since the adopted PMP envisions potential commercial development at the southern end of the RWF, between the RWF operational area and Highway 237, the proposed southern odor fence line is north of the RWF property line (see Attachment B). Two other options will also be evaluated further for potential consideration in future phases of odor control:

Option 1 - Eastern odor fence line: The RWF's eastern property line will also serve as the odor fence line, since no allowance for potential commercial development is included in the adopted PMP in the area between the main treatment facility and the eastern property line. However, since the sludge lagoons and drying beds are to be decommissioned as sludge handling transitions to mechanical dewatering and drying, that area could in the future be designated for development. Therefore, an alternative eastern odor fence line which is closer to the reduced treatment area may need to be considered along with future phased odor control. Further analysis will be conducted in the Study to define the sensitivity of moving this odor fence line closer to the RWF operational area.

Option 2 - Northern odor fence line: The inclusion of Pond A18 within the odor fence line area may encompass other odor emitting sources. However, exclusion of Pond A18 will bring the odor fence line much closer to the RWF operating area and require a higher level of odor control. Further analysis will be conducted in the Study to define the sensitivity of moving this fence line in closer.

## **Odor-Control Implementation Plan**

Key components of the OIP are outlined below.

### *Sampling and Modeling*

Once the odor goal and RWF odor fence line has been established, the consultant will complete the RWF-specific sampling and odor modeling effort that was initiated in 2011 and will reflect new odor emission sources on site. For example, the new Headworks was not operating during previous sampling. Site-specific meteorological and topographical information will be incorporated into an odor-dispersion model. The odor dispersion model will be a key analytical tool for sizing the odor treatment facilities needed to meet the odor goals at the odor fence line.

The odor dispersion model will confirm the specific liquids and solids treatment processes at the RWF and the associated CIP projects that require odor control measures and rank them on the basis of their offsite odor emission potential. The dispersion model will be used to select and size appropriate odor control facilities for the various odor sources and to evaluate how the RWF's overall odor profile is modified as new facilities are implemented. The anticipated completion date for this effort is February 2015.

### *Design Criteria and Technology Options*

The consultant will assess the level of odor control and odor-related corrosion control needed for each odorous process identified. The consultant will then establish the odor and corrosion control design criteria and recommend the most appropriate and proven technologies to meet the D/T odor threshold goal and corrosion control objectives. The consultant will also evaluate the impacts of proposed odor and corrosion control technologies on capital and O&M costs, site use, and restriction on mobility within the RWF. The anticipated completion date for this effort is June 2015.

### *Implementation Schedule and Budget*

Subsequent to the completion of the odor dispersion model and development of the design criteria and technology options, the consultant will develop an implementation schedule and budget. The odor control measures will be implemented as components of CIP projects. CIP projects include rehabilitation of existing infrastructure, new infrastructure, and emptying of existing lagoons and drying beds. The consultant will develop and analyze alternative scenarios for CIP projects and also evaluate possible phasing approaches and centralized or de-centralized odor control options.

Once the appropriate odor control measures have been selected, they will be implemented as part of multiple CIP projects. Based on the project delivery schedules developed through the RWF CIP, the OIP will develop an overall implementation schedule for odor control measures.



The OIP will also recommend interim sampling and modeling to be conducted as the projects are implemented to verify the overall RWF odor profile is being modified as predicted by the model. The intent of the interim sampling is to also enable calibration of the odor dispersion model and adjustments as necessary. Upon completion of the final odor-control project, final field sampling will be performed to verify the RWF odor profile is within the target threshold set at the selected odor fence line.

The anticipated completion date of the OIP is July 2015.

### **EVALUATION AND FOLLOW-UP**

The OIP will be brought forward for Council consideration in summer 2015. A progress report on the RWF capital improvement projects will be made to the Transportation and Environmental Committee and the Council on a semiannual basis. Additionally, individual CIP projects with odor control measures will be brought forward for Council action on contract awards.

### **PUBLIC OUTREACH**

This memorandum will be posted on the City's website for the November 18, 2014 City Council meeting agenda.

### **COORDINATION**

This staff report has been coordinated with the Department of Public Works and the City Attorney's Office.

### **FISCAL/POLICY ALIGNMENT**

This recommendation is consistent with the goals and objectives of the Envision San José 2040 General Plan and addresses critical infrastructure investment.

### **COST SUMMARY/IMPLICATIONS**

The PMP developed planning-level cost estimates for the odor control facilities envisioned for the RWF. The project validation process, completed in February 2014, updated these estimates. The project costs are summarized as follows:

Project	Treatment Technology	Project Cost, \$ million
New Headworks	Packed Tower Scrubber + Activated Carbon	\$13.5
East Primary Rehabilitation, Seismic Retrofit, and Odor Control	Packed Tower Scrubber + Activated Carbon	44.4
Digester and Thickener Facilities Upgrade	Packed Tower Scrubber + Activated Carbon	3.7
Digested Sludge Dewatering Facility	Packed Tower Scrubber + Activated Carbon	8.1
Thermal Drying Facility	Packed Tower Scrubber + Activated Carbon	6.9
<b>TOTAL</b>		<b>\$76.6</b>
<u>Note:</u> Project cost estimates are escalated using a 3% per year escalation factor and include a 15 percent estimate contingency, 25 percent scoping contingency, and 30 percent engineering, legal, and administration allowance.		

Updated estimates will be included in the OIP. It is important to note that the above cost estimate does not include decommissioning of the existing lagoons and drying beds; however, this project does impact odors and will thus be included in the OIP.

### CEQA

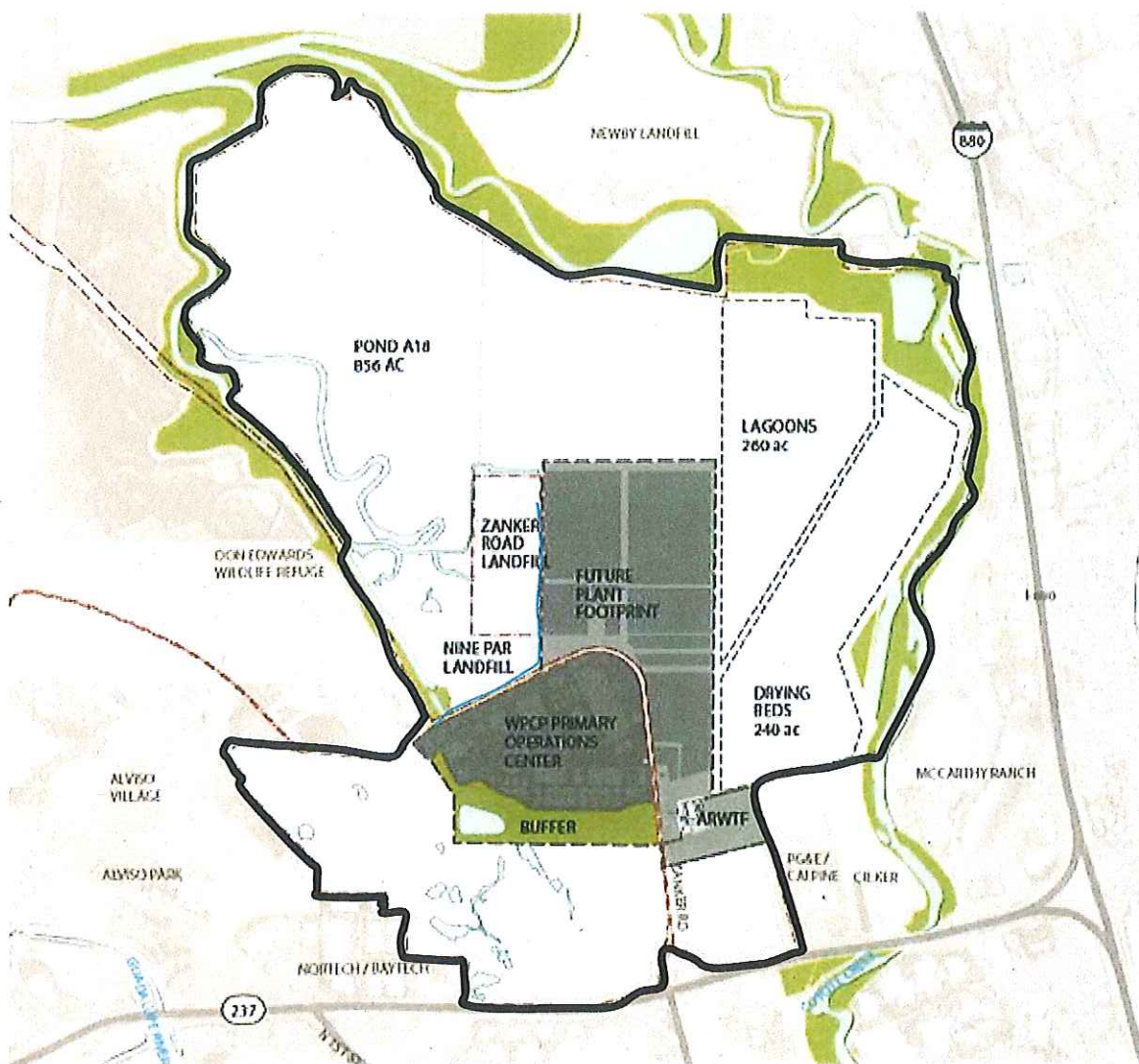
Not a Project, File PP10-069(a), City Organizational and Administrative Activities.

/s/

KERRIE ROMANOW  
Director, Environmental Services

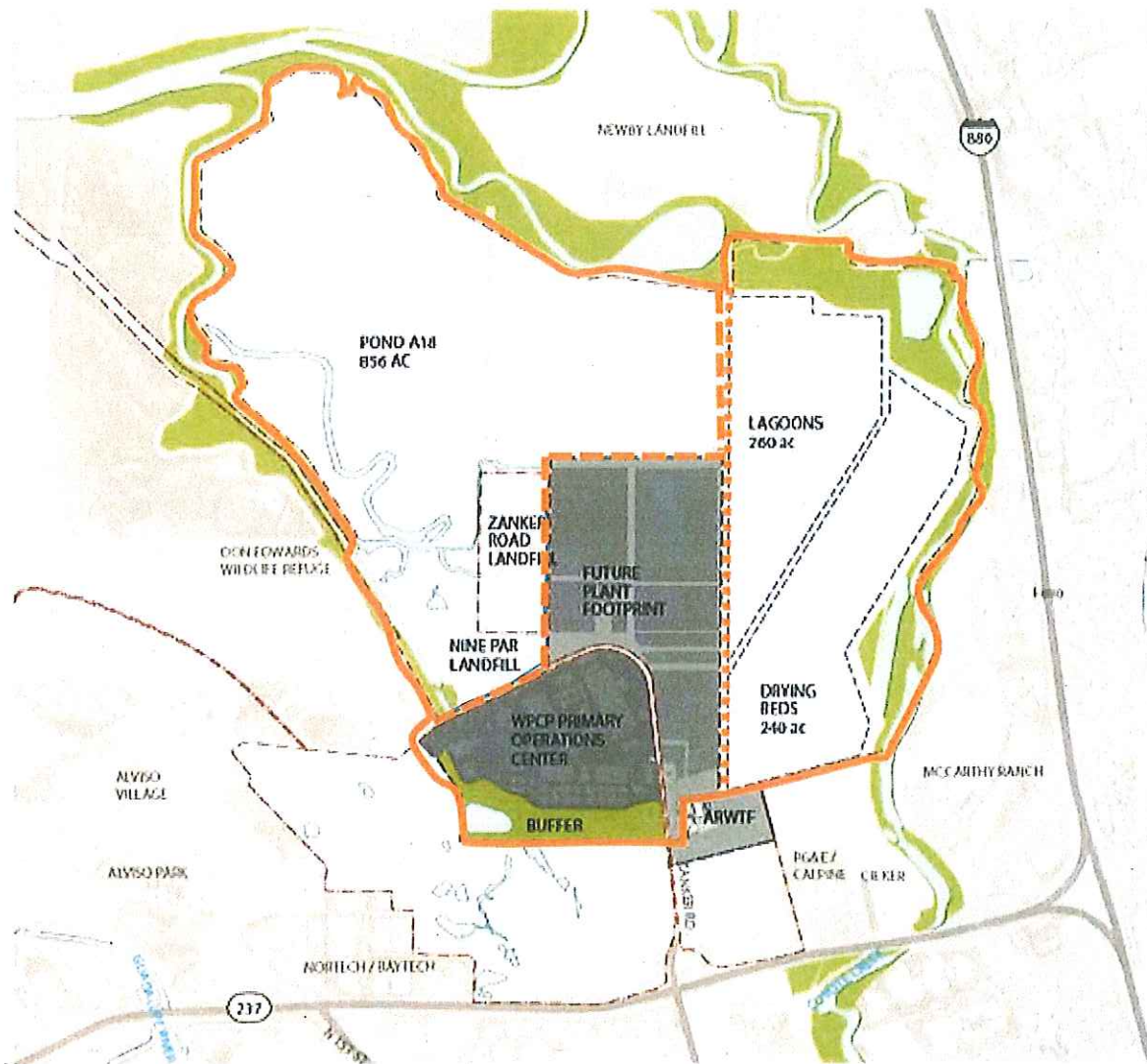
For questions please contact Ashwini Kantak, Assistant Director of Environmental Services Department, at (408) 975-2553.





— RWF property line

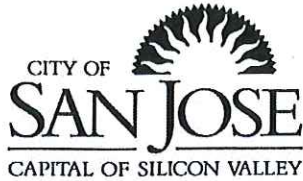
Attachment A



- **Proposed odor fence line**
- - - - - **Option 1 – Eastern odor fence line**
- - - - - **Option 2 – Northern odor fence line**

**Attachment B**





# Memorandum

**TO:** TRANSPORTATION AND  
ENVIRONMENT COMMITTEE

**FROM:** Kerrie Romanow

**SUBJECT:** BIOSOLIDS TRANSITION  
STRATEGY UPDATE

**DATE:** October 22, 2014

Approved

Date

10-22-14

## RECOMMENDATION:

Accept this staff report that provides an update on the Biosolids Transition Strategy for the San José-Santa Clara Regional Wastewater Facility.

## BACKGROUND

The cities of San José and Santa Clara jointly own the San José-Santa Clara Regional Wastewater Facility<sup>1</sup> (RWF) which serves six other South Bay cities in part, through four special districts. The RWF has been in operation since 1956 at its current location on Zanker Road just north of Highway 237 in North San Jose. The RWF is the largest advanced wastewater treatment facility in the Western United States and treats an average of 110 million gallons per day of wastewater. About 100 million gallons of the treated wastewater is discharged into the South Bay and approximately 10 million gallons are recycled for use in irrigation, toilets and cooling towers in parts of San José, Santa Clara, and Milpitas.

Treating the wastewater also results in approximately 85 dry tons of biosolids per day which must be disposed of or beneficially reused. The current treatment process stabilizes the solids in anaerobic digesters, and then transfers the digested sludge to open-air lagoons for approximately three years before moving the biosolids to drying beds for another year. The anaerobic digesters are a commonly used solids stabilization process in wastewater treatment, where sludge is heated and biologically stabilized in covered tanks. This solids stabilization process significantly reduces the amount of volatile material and pathogens in the sludge, and lowers the odor potential in downstream processes. The dried biosolids are then transported to the adjacent Newby Island landfill for use as an alternative daily cover material. The current process creates a "Class A" product which is the highest level of treatment as defined by federal regulators.

<sup>1</sup> The legal, official name of the facility remains San Jose/Santa Clara Water Pollution Control Plant, but beginning in early 2013, the facility was approved to use a new common name, the San José-Santa Clara Regional Wastewater Facility.



Most of the RWF's infrastructure is now more than 50 years old and has exceeded its useful life, with repairs needed to every process area. In 2008, the RWF embarked on a master planning process to rehabilitate and upgrade its facilities and to explore potential process changes. The Plant Master Plan (PMP) used an extensive community engagement process to develop overarching environmental, economic, social, and operational goals for the RWF. To support these goals, the PMP envisioned a comprehensive Biosolids Management Program (BMP) that would transition from the current process to an enclosed, mechanical treatment system with the resulting dewatered biosolids hauled off-site. The BMP also called for flexibility with multiple and diversified disposition options for the biosolids.

The BMP envisioned a mix of Class A and Class B biosolids products. The US Environmental Protection Agency (USEPA) defines the processes and handling requirements of wastewater sludge in terms of "Class A" and "Class B" biosolids products. Class A biosolids, with the highest level of treatment, contain very low levels of volatile material and pathogens and thus lend themselves to safe land application. Class B biosolids, with a lower level of treatment, have a higher level of pathogens than Class A, which places some limitations on the end uses of the sludge. Key BMP goals included minimizing disposal volume and costs, reducing footprint/greenhouse gas emissions and odors, using innovative approaches, maximizing reuse of biosolids in the community, and increasing flexibility and diversity in disposition options. The major project elements recommended for the BMP include:

- Rehabilitation of the existing sludge thickening and digester facilities;
- Mechanical dewatering for all of the biosolids; with 70% of the biosolids material going to off-site uses and disposal
- Thermal drying for 20% of the biosolids and Greenhouse drying for 10% of the biosolids;
- Decommissioning of the existing open sludge lagoons and drying beds; and
- Multiple disposition options and contracts for biosolids reuse/disposal.

The mechanical dewatering process will remove a significant portion of the water in the digested sludge to reduce the overall volume of sludge to be hauled offsite. The thermal drying process is an additional process to remove most of the water by heating the digested sludge in an enclosed vessel. Similar to thermal drying process, the Greenhouse drying process uses the sun to heat and dry the sludge. More detail on the BMP can be found at <http://sjenvironment.org/ArchiveCenter/ViewFile/Item/1554> Final Draft of Project Memorandum No. 2 Biosolids Treatment Alternatives dated August 2011.

The PMP was adopted and the Environmental Impact Report certified by the San José City Council in November 2013 and by Santa Clara City Council in December 2013. Subsequent to the PMP adoption, a Biosolids Transition Strategy project was initiated to review the feasibility of diversifying disposition options and to evaluate ways to reduce environmental impacts, use modern technologies for the biosolids processing, and evaluate alternate delivery options for the construction of the facilities (e.g., design-build).

On April 10, 2014, staff presented preliminary information on the Biosolids Transition Strategy to the Treatment Plant Advisory Committee (TPAC) at a Biosolids Study Session. The Study Session also provided an opportunity for TPAC and various stakeholders to provide their perspective and input on the transition strategy. Discussion topics included a summary of the



PMP recommendations, an overview of Biosolids management approaches, a discussion of various disposition options, and potential project and disposition options for the RWF. Staff also outlined steps to solicit interest from the open market and the methodology for conducting business case evaluations in order to bring back recommendations to the City Council in fall 2014. Feedback from TPAC on the biosolids transition strategy included consideration of odor impacts, expandability of the facility in the future, possibility of producing Class A biosolids instead of Class B biosolids, and impact on operation and maintenance costs.

## ANALYSIS

Although the PMP was officially adopted in 2013, the technical component of the PMP was completed in 2010. During the three-year environmental review process, there were a number of changes in conditions related to the BMP that required staff to reevaluate the assumptions and recommendations in the BMP. Since the TPAC study session in April 2014, staff has made significant progress on the Biosolids Transition Strategy. Key elements of the work include testing the market interest for treatment and disposition options, evaluation of alternate sites for the project elements, and business case evaluations of the various project options that would best achieve the goals established in the BMP. These changes and follow-up are summarized below:

### Accelerated Delivery Schedule

In May 2011, in response to community concerns about odors emanating from the lagoons and drying beds, the City Council directed staff to accelerate the biosolids transition process and cease discharging biosolids to the existing lagoons by 2018, followed by emptying the lagoons and drying beds by 2024. The PMP envisioned a three phase approach that would have decommissioned the lagoons and drying beds by 2030.

### Biosolids Facility Site

During the PMP EIR process, it was determined that the planned location of the proposed biosolids facilities contained potential wetlands and aquatic habitat. Siting facilities in such a location would likely trigger extensive environmental mitigation and a lengthy permitting process. The resulting schedule delays would push project completion out well beyond the 2018 goal. Therefore, alternative sites needed to be evaluated.

Four alternative sites have been evaluated to identify constraints including available space, existence of sensitive environmental conditions, presence of existing and planned facilities, and capacity to accommodate potential new and future biosolids facilities. The recommendation of a final site is pending based on additional environmental field work to be done in October 2014. The alternative sites are shown in Attachment A. A recommendation will be brought forward to Council in December for approval of an alternative site as part of the Biosolids Transition Strategy.

### Biosolids Market

In April 2014, TPAC directed staff to evaluate the possibility of producing Class A biosolids instead of Class B biosolids. Evaluation of options for the Digester Rehabilitation project led to



the selection of a Temperature Phased Anaerobic Digestion (TPAD) process technology to provide the flexibility to produce Class A biosolids as well as further enhance the stabilization of biosolids and increase energy production.

In June 2014, a "Request for Information (RFI) for the Biosolids Transition Program" was issued to determine market interest in the processing and/or disposition of the dewatered biosolids product that will be produced from the new Biosolids Dewatering Facility. Eleven responses to the RFI were received. The RFI process results have indicated that a wide variety of local biosolids disposition markets are available including composting, land application and landfill to meet the BMP diversification objectives. All respondents expressed interest in accepting either Class A or Class B biosolids, and 70% of them were also interested in contracting with the City regarding the final disposition of the dewatering biosolids product or producing diversified end products (Class A biosolids) onsite or offsite to provide flexibility in disposition options. A contract term of five years was considered to be acceptable by most proposers. The RFI response results also show that the hauling and disposition price range provided in the RFI responses is relatively close to a 2013 Bay Area survey that was previously reviewed by staff. The current biosolids disposition costs are \$22.50 per ton to Newby Island Landfill. The RFI responses indicated disposition costs would range from \$20 to \$85 per ton. A summary of the responses is included in Attachment B.

#### Project Validation Process

The CIP Program team conducted a detailed project validation process of all the PMP projects in early 2014. This validation effort led to a change in assumption from a large, covered storage lagoon (sized for 180 days of storage) to a short-term enclosed storage facility located at the Biosolids Dewatering Facility, which is more in line with best practices in the wastewater industry and results in a smaller footprint and lower costs.

#### Business Case Evaluations

During the April TPAC Study Session, staff discussed triple bottom line plus methodology with social, economic, environmental, and operational criteria for evaluating various project options. This methodology included analyzing quantitative and qualitative criteria. Quantitative criteria includes capital costs, net present value and schedule and qualitative criteria includes the ability to meet underlying goals, ease of maintenance and operations, ease of permitting and project delivery, and flexibility to move disposition options.

The first step of the evaluation process included a screening of biosolids processing alternatives which was conducted using the Solids-Water-Energy Tool (SWET) Model. The analysis helped screen out less favorable alternatives and provided a basis in subsequent business case evaluations (BCEs). The analysis concluded that producing 100 percent Class A biosolids, either by expanding on-site drying capacity or by sending 100 percent of the dewatered biosolids to an off-site composting facility, would not be cost-effective relative to other alternatives.

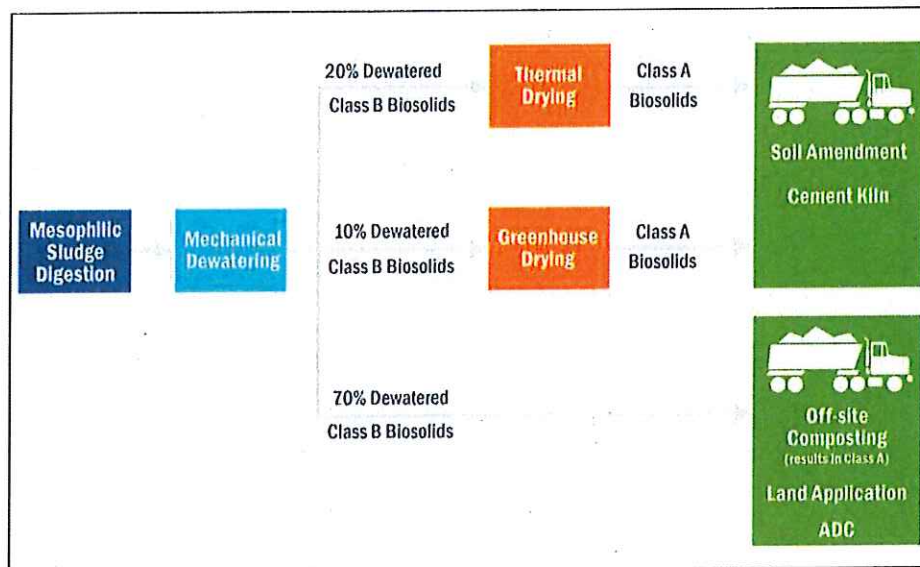
The analysis further concluded that TPAD digestion, coupled with batch tanks, appeared to be one of the more cost effective methods for producing Class A biosolids. However, a number of



potential alternatives appeared to be essentially equivalent from a cost perspective and the study recommended that further analysis, which should include non-economic factors, was warranted. A consultant is currently performing BCEs to enable staff to develop recommendations related to components and timing of new biosolids facilities. The BCE analysis uses a Triple Bottom Line Plus methodology, similar to that used in the PMP, which includes four main evaluation categories: economic, environmental, social, and operational.

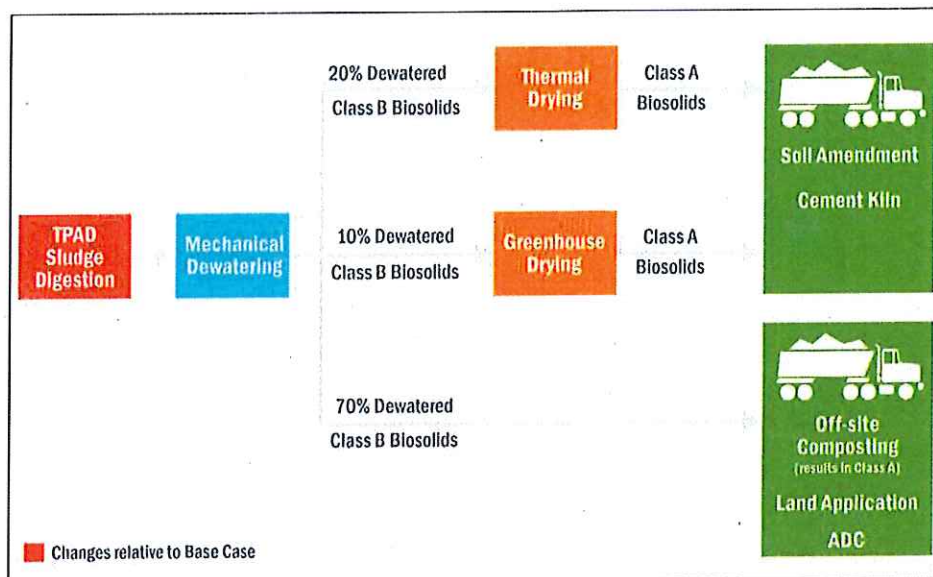
The base case PMP recommendation is shown in Figure 1.

**Figure 1: Base Case PMP Recommendation with Mesophilic Digestion**

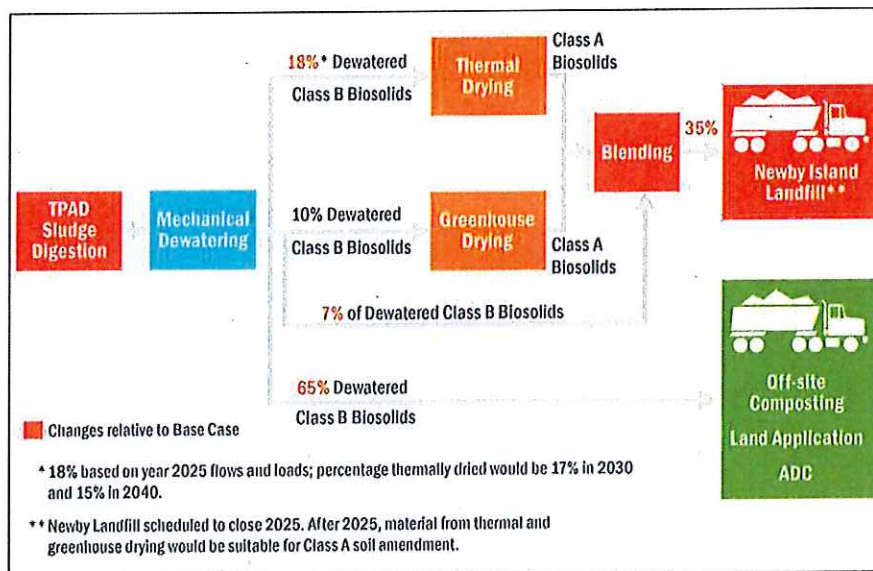


Three alternatives being evaluated and compared against the base case are depicted below. Each alternative provides multiple disposition options; Alternatives 1 and 2 result in a mix of Class A and Class B biosolids while Alternative 3 results in Class B biosolids in the near term with the flexibility to produce all Class A biosolids in the future.

**Figure 2: Alternative 1 – Modified Base Case with Thermophilic Digestion**

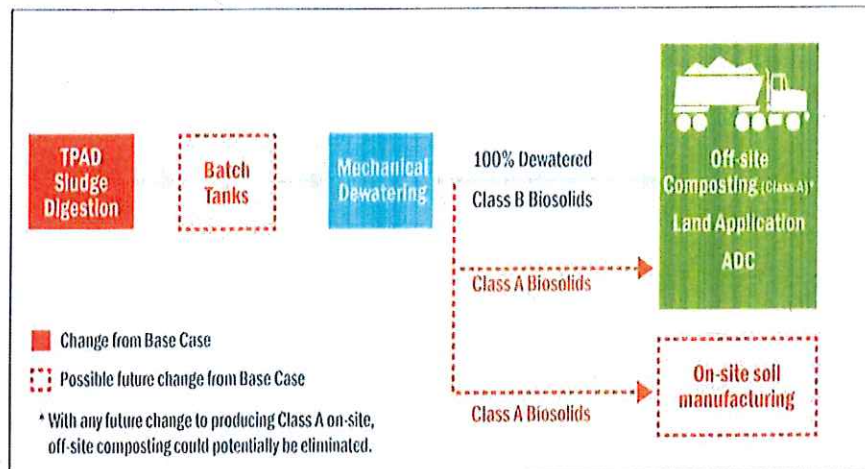


**Figure 3: Alternative 2 – Base Case with a Blending Option**





**Figure 4: Alternative 3 – Thermophilic Digestion with Future Batch Tanks**



Based on the responses from the biosolids market, all BCEs assume that a new biosolids dewatering facility will be required. Major components of this project will include dewatering equipment, polymer feeding systems, short-term storage, conveyance, odor treatment, and truck load-out facilities. Once the dewatering facilities are on-line, the decommissioning of the existing lagoons and drying beds will be able to commence.

An evaluation of project delivery methods (e.g., design-bid-build, design-build) is also being prepared. The evaluation will be completed in October 2014 and will inform staff recommendations that will be brought forward to Council in December.

### Cost Implications

The CIP project validation process that was completed in February 2014 identified approximately \$397 million in capital costs for the implementation of the biosolids transition. Projects include Digester and Thickener Facilities Upgrade Project, Additional Digester Facility Upgrades, Digested Sludge Dewatering Facility, FOG Receiving, Lagoons and Drying Beds Retirement, Greenhouse Drying Demonstration Project, and Thermal Drying Facility. When the new biosolids facilities come online and while the existing lagoons and drying beds are still being decommissioned, existing O&M costs are anticipated to be increased by about \$14 million. Once the decommissioning has been completed, the new facilities will still require an additional \$8 million in O&M costs in comparison to existing O&M costs. Additional cost information will be brought forward to Council as part of the BCE analysis and staff recommendations. Furthermore, detailed cost estimates will be developed for the individual project components.

### Next Steps

Upcoming activities related to the Biosolids Transition Strategy include:

- Complete the alternative site analysis, business case and project delivery evaluation;

TRANSPORTATION AND ENVIRONMENT COMMITTEE

October 22, 2014

Subject: Biosolids Transition Strategy Update

Page 8

- Prepare the Biosolids Transition Strategy including recommendations for the near term and longer term Biosolids Management Program;
- Continue with the preliminary design of the sludge thickening and digestion facilities;
- Initiate early project planning activities for the dewatering facility; and
- Bring forward recommendations on the Biosolids Transition Strategy to TPAC in November and City Council in December.

**PUBLIC OUTREACH/INTEREST**

This memorandum will be posted on the City's website for the November 3, 2014 Transportation and Environmental Committee Agenda, and will be presented to the Treatment Plant Advisory Committee (TPAC) at their November 13, 2014 meeting.

**COORDINATION**

This report has been coordinated with the Department of Public Works and the City Attorney's Office.

**CEQA**

Not a project, File No. PP10-069 (a) Staff Reports.

/s/

Kerrie Romanow  
Director, Environmental Services

For questions, please contact Ashwini Kantak, Assistant Director (ESD), at 408-975-2553.

Attachments:

A – Alternative Sites Considered for New Biosolids Processing Facilities

B – A Summary of Biosolids Market RFI Responses



**Attachment A - Alternative Sites Considered for New Biosolids Processing Facilities**





## Attachment B - A Summary of Biosolids Market RFI Responses

Respondent	Proposed Technology	Technology Status	Type of Reuse	Acceptable Biosolids	Type of Contract	Disposition Cost <sup>[1]</sup>
CH2M Hill	Thermal Drying	Proven	Pelletized Fuel Soil Enhancement/Fertilizer	Class A or B	N/A	N/A
NEFCO	Thermal Drying	Proven	Pelletized Fuel Fertilizer	Class A or B	Service & Disposition	\$60-\$70
USG	Belt Dryer	Proven	Alternative Fuel Land Application	Class A or B	Service only	\$30-\$50
Liberty	Composting	Proven	Compost	Class A or B	Service & Disposition	\$20-\$30
Synagro	Land Application Composting	Proven	Land Application Compost ADC	Class A or B	Service & Disposition	\$30-\$40
Terra Renewal	Land Application Composting	Proven	Land Application ADC	Class A or B	Service & Disposition	\$20-\$30
Degremont	N/A		N/A	Class A or B	N/A	N/A
Lystec	Hydrolysis Land Application	Emerging	Liquid Fertilizer for Land Application	Class A or B	Service & Disposition	\$50-\$60
VitAg	Fertilizer	Emerging	Class A Fertilizer	Class A or B	Service & Disposition	\$20-\$60
Biogas Equity 2	Gasification	Non-Commercial Proven	Syngas	Class A or B	Service & Disposition	N/A
Gate 5 Energy	Dryer Combustion Energy Recovery	Non-Commercial Proven	Renewable Electricity	Class A or B	Service & Disposition	\$40-\$85

Notes:

1. Disposition cost is per wet ton based on 25% solids. Transportation is not included in the disposition cost.





# Memorandum

**TO:** HONORABLE MAYOR  
AND CITY COUNCIL

**FROM:** Kerrie Romanow

**SUBJECT:** SEE BELOW

**DATE:** October 24, 2014

Approved

Date

10/24/14

**SUBJECT: AGREEMENT WITH VITOL INC FOR THE PURCHASE OF  
CALIFORNIA CARBON ALLOWANCES**

## REASON FOR ADDENDUM

To meet a deadline set by the California Air Resources Board, the San José-Santa Clara Regional Wastewater Facility must purchase credits as part of the Cap-and-Trade program by November 3, 2014, and avoid potential penalties.

## RECOMMENDATION

Adopt a resolution authorizing the City Manager to execute an agreement between the City of San Jose and Vitol Inc for the purchase of California Carbon Allowances (CCA's) for the San Jose-Santa Clara Regional Wastewater Facility (RWF) as part of the California Cap-and-Trade Program for an amount not to exceed \$306,605.25.

## BACKGROUND

The Global Warming Solutions Act of 2006, or Assembly Bill (AB) 32, is a California State Law that fights climate change by establishing a comprehensive program to reduce greenhouse gas emissions from all sources throughout the state. AB 32 requires the California Air Resources Board (ARB) to develop regulations and market mechanisms to reduce California's greenhouse gas emissions to 1990 levels by the year of 2020, representing a 25% reduction statewide, with mandatory caps beginning in 2012 for significant emissions sources. Greenhouse gases are comprised of methane, nitrous oxide, and carbon dioxide emissions. Annual emissions are measured in carbon dioxide equivalents (CO<sub>2</sub>e), a standardized measure that allows the effect of different greenhouse gases and other factors to be compared using carbon dioxide as a standard unit for reference. The CO<sub>2</sub>e measurement is given in metric tons per year for greenhouse gas reporting.

October 24, 2014

Subject: Agreement between City of San José and Vitrol Inc.

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Stationary combustion facilities that combust less than 10,000 metric tons of CO<sub>2</sub>e annually are not mandated for greenhouse gas reporting. Facilities that emit greater than 10,000 metric tons are subject to mandatory reporting. Facilities that emit 25,000 metric tons of CO<sub>2</sub>e are required to participate in California's Cap-and-Trade program.

Cap-and-Trade is a market based regulation that is designed to reduce greenhouse gases (GHGs) from multiple sources and creates a market to trade credits for those facilities that are part of the program.

### **ANALYSIS**

Until recently, the RWF has run its engines on a blend of digester gas produced as part of the RWF's processes, landfill gas purchased from Republic Services' nearby landfill, and natural gas purchased from PG&E. Biomass fuel such as digester and landfill gas are exempt from the Cap-and-Trade program. Equipment used to store digester gas failed, and the interim solutions limited the amount of digester gas available for use, so the purchase of natural gas increased. In addition, quantity and consistency of the landfill gas supply led to the elimination of its use. This placed the RWF in the Cap-and-Trade program for 2013. As such, the RWF is purchasing credits in accordance with the program.

The RWF will have a new gas holder in place in the near future, has initiated operational review to minimize the use of natural gas when possible, and is investigating additional sources of renewable energy. These measures should allow the RWF to exit the Cap-and-Trade program in 2015.

### **PUBLIC OUTREACH/INTEREST**

This memorandum has been posted on the City's website for the October 28, 2014 meeting City Council meeting.

### **COORDINATION**

The memorandum has been coordinated with the City Manager's Budget Office, and the City Attorney's Office.



HONORABLE MAYOR AND CITY COUNCIL

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**COST SUMMARY/IMPLICATIONS**

1. AMOUNT OF RECOMMENDATION: \$ 306,605.25\*

**TOTAL AGREEMENT AMOUNT \$ 306,605.25**

\* Funding for this purchase will come from the San José/Santa Clara Treatment Plant Operating Fund (513).

2. FISCAL IMPACT: No additional funding is necessary to approve this purchase.

**CEQA**

Not a Project, File No. No. PP10-066(d), Consultant Services.

/s/

KERRIE ROMANOW

Director, Environmental Services

For questions please contact René Eyerly, Sustainability and Compliance Manager at (408) 975-2594.

**AGREEMENT FOR THE PURCHASE AND SALE OF  
CALIFORNIA CARBON ALLOWANCES**

**TRANSACTION CONFIRMATION LETTER**

To: City of San Jose California

From: Vitol Inc.  
1100 Louisiana, Suite 5500  
Houston, TX 77002

Vitol Contract #: 2126520

The purpose of this letter (this "**Confirmation Letter**") entered into this \_\_\_\_\_ day of October 2014 (the "**Effective Date**") is to confirm the terms and conditions of the transaction between Vitol Inc. ("**Seller**") and City of San Jose California ("**Buyer**") as of the Effective Date (the "**Transaction**"). Seller and Buyer are each referred to as a "**Party**" and, collectively, as the "**Parties**." This Confirmation Letter, including and incorporating the attached General Terms and Conditions and Schedules thereto, shall constitute the entire agreement ("**Agreement**") between the Parties related to the subject matter hereof and supersedes and replaces any prior oral or written confirmation, including broker confirmations, regarding this Transaction.

The terms of the Transaction to which this Confirmation Letter relates are as follows:

<b>Trade Date:</b>	October 22, 2014
<b>Seller:</b>	Vitol Inc.
<b>Buyer:</b>	City of San Jose California
<b>Product:</b>	California Carbon Allowances ("CCA's")
<b>Delivery:</b>	Prompt Upon Execution
<b>Vintage(s):</b>	2013
<b>Contract Quantity</b>	25,029 CCA's
<b>Contract Price:</b>	\$12.25 per CCA
<b>Total Contract Price:</b>	\$306,605.25

Capitalized terms used but not defined herein shall have the meanings given to them in the General Terms and Conditions.

1. **Purchase and Sale.** Seller shall sell to Buyer, and Buyer shall purchase from Seller, for the Contract Price, the applicable Contract Quantity of Product subject to and in accordance with the terms and conditions set out herein.

2. **Delivery.** Seller shall transfer the Contract Quantity of Product to the Buyer's Account in the relevant Registry and Tracking System, as applicable, in accordance with the then current ARB procedures. Buyer shall confirm the transfer within two (2) days as per ARB. "Delivery" shall be deemed to occur when the transfer of the Product into the Buyer's Account is complete as evidenced by the Parties' receipt of a notification from the System Administrator regarding completion of transfer, at which time, title to the Product transfers from Seller to the Buyer.



3. **Payment.** Seller shall, upon initiating Transfer, provide an invoice to Buyer. Within three (3) Business Days of receipt of such invoice and confirmation of allowance transfer, Buyer shall pay to Seller the Contract Price for the Product. Buyer shall make such payment by wire transfer of immediately available United States dollars to an account designated by Seller or as otherwise reasonably requested by Seller. If payment is not made within the time specified, without limiting Seller's rights and remedies, the past due amount shall carry interest at the Interest Rate.

4. **Term.** This Agreement shall commence on the Effective Date and shall terminate on the date on which both Parties have completed the performance of their obligations hereunder, unless earlier terminated pursuant to the terms hereof (the "**Term**").

Yours truly,

**Vitol Inc.**

By: \_\_\_\_\_  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_

Accepted and Agreed:  
**City of San Jose California**

By: \_\_\_\_\_  
Name: \_\_\_\_\_  
Title: \_\_\_\_\_

**AGREEMENT FOR THE PURCHASE AND SALE OF  
CALIFORNIA CARBON ALLOWANCES**

**GENERAL TERMS AND CONDITIONS**

**1. DEFINITIONS**

1.1 Definitions. In addition to any other terms defined in the Confirmation Letter or these General Terms and Conditions, the following terms shall have the meaning ascribed to them as set forth below:

**"Applicable Law"** means the Common Law and the law of equity, and all federal, state, regional and municipal laws, including without limitation all statutes, regulations and bylaws, and all rules, policies, guidelines, directives, orders, or other similar items having the force of law in respect of the Parties and the Transaction.

**"Applicable Emissions Law"** means the California Global Warming Solutions Act of 2006 (otherwise known as Assembly Bill No. 32), together with associated regulations and any amendments thereto.

**"Cap-and-Trade Regulations"** shall mean the California Cap on Greenhouse Gas Emissions and Market-Based Compliance Mechanisms, Subchapter 10 Climate Change, Article 5, Section 95800 to 96023, Title 17, California Code of Regulations, as it may be amended or supplemented from time to time, together with any guidance documents, forms, or instructions issued by CARB in connection with the administration of thereof.

**"CARB"** shall mean the California Air Resources Board or successor entities with similar functions with respect to the Cap-and-Trade Regulations.

**"ACP"** means the Auction Clearing Price for each quarterly ARB auction. It is the price which successful bidders will pay for their ARB Allowance for that quarterly Auction.

**"Business Day"** means a day except Saturday, Sunday or a Federal Reserve Bank holiday, and a Business Day shall begin at 8:00 a.m. and end at 5:00 p.m., local prevailing time for the receiving Party's main address for notices provided in Section 16.

**"California Carbon Allowance" or "CCA"** shall mean an Allowance as defined in the Cap-and-Trade Regulations.

**"California Carbon Offset" or "CCO"** shall mean an "ARB Offset Credit," as that term is defined in the Cap-and-Trade Regulations.

**"California Instrument Tracking System Service" or "CITSS"** means the Compliance Instrument Tracking System Service authorized by the Cap-and-Trade Regulations and administered by the Western Climate Initiative, Inc., or any successor system thereto.

**"Buyer's Account"** means Buyer's primary account in an ARB approved Allowance or Offset Registry or Tracking System

**"Confidential Information"** means all oral and written information exchanged between the Parties with respect to the subject matter of this Agreement. The following information does not constitute Confidential Information for purposes of this Agreement: (a) information that is or becomes generally available to the public other than as a result of a disclosure by either Party in violation of this Agreement; (b) information that was already known by either Party on a non-confidential basis prior to this Agreement; and (c) information that becomes available to either Party on a non-confidential basis from a source other than the other Party if such source was not subject to any prohibition against disclosing the information to such Party.

**"Contract Price"** has the meaning for each Contract Quantity as set out in the Confirmation Letter.

**"Force Majeure"** means an event or circumstance which materially adversely affects the ability of a Party to perform its obligations under this Agreement, which event or circumstance was not reasonably anticipated as of the Trade Date and which is not within the reasonable control of, or the result of the negligence of, the Party claiming Force Majeure, and which the claiming Party is unable to overcome or avoid or cause to be avoided, by the exercise of reasonable care. Force Majeure may not be based on (i) the loss or failure of Buyer's markets; (ii) Buyer's inability economically to use or resell the Product; (iii) Seller's ability to sell the Product to another at a price greater than the Unit Price; (iv) Buyer's ability to produce Product; or (v) Buyer's ability to purchase product similar to the Product at a price less than the Unit Price. Force Majeure may include a change in Applicable Law or Applicable Emissions Law and may, to the extent such a change falls under Section 6, require a negotiated amendment to this Agreement. A Party's obligation to make payments hereunder shall be subject to a Force Majeure event only to the extent and for such time as an event or act of a governmental authority has on any day disabled the banking system through which the claiming Party makes such payments.

**"Interest Rate"** means a per annum rate of interest equal to two (2%) percent over the prime lending rate as published from time to time in the Wall Street Journal under "Money Rates" on such due date (or if not published on such day on the most recent preceding day on which published), but in no event to exceed the maximum lawful rate.

**"Market Price"** means the market price determined based on the average of prices quoted by four (4) independent third party leading market dealers after excluding the highest and lowest quotes, with Buyer and Seller each selecting in good faith two (2) independent market dealers.

**"Performance Assurance"** means collateral in the form of either cash, Letter(s) of Credit, or other security acceptable to Party A, pursuant to Section 3.



"**Proceeding**" means any action, suit or proceeding pending, or to Seller's knowledge threatened, against Seller at law or in equity, alleging a competing claim for title to Product to be transferred to Buyer to fulfill the terms of this Agreement, or rights to the benefits from the emissions reductions or removals that were or will be used to obtain such Product, or to Seller's knowledge, the existence of a state of facts which could give rise to any such action, suit or proceeding.

"**Registry**" means a registry approved by the ARB, evidencing the origination and/or ownership of Offsets and or Allowances, and facilitating transfer among account holders.

"**Replacement Price**" means the price, determined by Buyer in a commercially reasonable manner, at which Buyer purchases (if at all) substitute Product for the deficiency or, if Buyer is unable to make such a purchase, the Market Price for such quantity of Product at the time that Seller fails to deliver the Product.

"**Sales Price**" means the price, determined by Seller in a commercially reasonable manner, at which Seller resells (if at all) the Product, or, absent such a sale, the Market Price for such quantity of Product at the time that Buyer fails to accept the Product.

"**System Administrator**" means the ARB or subsequent authority charged with the administration of the Registry(s) and Tracking System(s) under the Applicable Emissions Law.

"**Tracking System**" means the system(s) established pursuant to the Applicable Emissions Law by which the System Administrator records allocations, deductions and transfers of ARB Allowances and/or Offsets.

"**Vintage**" means, in respect of an ARB Allowance or Offset, the calendar year in which the emissions reductions and removals represented thereby occurred.

## **2. REPRESENTATIONS AND WARRANTIES**

**2.1** Representations and Warranties of Both Parties. As of the Effective Date, each Party hereby represents, warrants and covenants to the other Party that:

- (a) it is duly organized, validly existing and in good standing under the laws of the jurisdiction of its formation;
- (b) it has all regulatory authorizations necessary for it to legally perform its obligations under this Agreement;
- (c) the execution, delivery and performance of this Agreement is within its powers, have been duly authorized by all necessary action and do not violate any of the terms and conditions in its governing documents, any contracts to which it is a party or any law, rule, regulation, order or the like applicable to it;
- (d) this Agreement and each other document executed and delivered in accordance with this Agreement constitutes its legally valid and binding obligation enforceable against it in accordance with its terms; subject to any equitable defenses, bankruptcy principles, or the like;
- (e) no Event of Default (as defined in Section 8 below) with respect to it has occurred and is continuing and no such event or circumstance would occur as a result of its entering into or performing its obligations under this Agreement;
- (g) it is acting for its own account, has made its own independent decision to enter into this Agreement and as to whether this Agreement is appropriate or proper for it based upon its own judgment, is not relying upon the advice or recommendations of the other Party in so doing, and is capable of assessing the merits of and understanding, and understands and accepts, the terms, conditions and risks of this Agreement;
- (h) it has entered into this Agreement in connection with the conduct of its business and it has the capacity or ability to make or take delivery of all Product referred to in this Agreement;
- (i) with respect to this Agreement, it is a producer, processor, commercial user or merchant handling the Product, and it is entering into such Agreement for purposes related to its business as such;
- (j) it or its agent is a registered account holder in the Registry or Tracking System with full rights to transfer the Product among accounts and will maintain such status for the Term of this Agreement; and,
- (k) it intends to physically settle the Transaction.
- (l) it is a "forward contract merchant" within the meaning of U.S. Bankruptcy Code §101(26), and this Agreement constitutes a "forward contract" within the meaning of U.S. Bankruptcy Code §101(26);
- (m) it is an "eligible commercial entity" and an "eligible contract participant" within the meaning of U.S. Commodity Exchange Act §1a(11) and §1a(12), respectively

### **2.2** Representations and Warranties of Seller.

Seller hereby represents, warrants and covenants to Buyer, and acknowledges and agrees that Buyer may represent, warrant and covenant the same to any third party in respect of any Product Delivered under this Agreement, that as of the Delivery Date:

- (a) Other than the rights granted to Buyer under this Agreement, Seller will be, immediately before any transfer to Buyer of Product pursuant to this Agreement, the sole registered and beneficial owner thereof, with good and marketable title thereto, free and clear of all encumbrances howsoever arising;
- (b) Provided Buyer's Account is in good standing, Seller is not a party to any agreement (oral or written), and has no knowledge of any agreement (oral or written), which in any way limits or restricts the transfer of Product to Buyer or the issuance to the Seller of any Product that is intended to be or could be transferred to Buyer to fulfill the terms of this Agreement;
- (c) The Delivered CCAs comply with the Applicable Emissions Law and can be used for compliance with the Applicable Emissions Law in the specified Vintage; and
- (d) Each CCA meets the specifications set forth in the Confirmation Letter.

**2.3** Limitation on Warranties. EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, EACH PARTY EXPRESSLY DISCLAIMS ANY OTHER REPRESENTATIONS OR WARRANTIES, WHETHER WRITTEN OR ORAL, AND WHETHER EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY REPRESENTATION OR WARRANTY WITH RESPECT TO CONFORMITY TO MODELS OR SAMPLES, MERCHANTABILITY, OR FITNESS FOR ANY PARTICULAR PURPOSE. WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, SELLER MAKES NO REPRESENTATION OR WARRANTY



HEREUNDER REGARDING ANY ACTION OR FAILURE TO ACT, OR APPROVAL OR FAILURE TO APPROVE, OF ANY AGENCY OR GOVERNMENTAL ENTITY. This Section 2.3 shall survive expiration or termination of any transaction(s) and/or this Agreement.

### 3. CREDIT ASSURANCES

If a Party ("Party A") has reasonable grounds to believe that the other Party's ("Party B") creditworthiness or performance under this Agreement has changed and become unsatisfactory, Party A will provide Party B with written notice requesting Performance Assurance in an amount determined by Party A in a commercially reasonable manner. Upon receipt of such notice, Party B shall have ten (10) Business Days to remedy the situation by providing such Performance Assurance to Party A. In the event that Party B fails to provide such Performance Assurance, or a guaranty or other credit assurance acceptable to Party A within ten (10) Business Days of receipt of notice, then an Event of Default will be deemed to have occurred and Party A will be entitled to the remedies set forth in Section 4, Remedies Upon Event of Default.

### 4. TAXES AND FEES

4.1 Each Party shall be responsible for any taxes or other fees associated with its respective purchase and sale hereunder. As used herein "taxes" means, but is not limited to, any or all ad valorem, property, occupation, severance, first use, conservation, gross receipts, privilege, sales, use, consumption, excise, lease, transaction, and other taxes, governmental charges, licenses, fees, permits and assessments, or increases therein, other than taxes based on net income or net worth. A tax is not a penalty or a fine.

4.2 Each Party hereby indemnifies, defends, and holds harmless the other Party from and against any claims or demands made by others arising from or out of any event, circumstance, act, or incident first occurring or existing during the period when control and title to the Renewable Energy Credits is vested in the indemnifying Party as provided herein, except to the extent arising from the indemnified Party's own gross negligence or willful misconduct. Each Party hereby further indemnifies, defends, and holds harmless the other Party from and against any Taxes for which the indemnifying Party is responsible under this Agreement.

4.3 Seller is responsible for all fees payable to the Registry or Tracking System in respect of the registration and transfer of Product pursuant to this Agreement arising before the transfer into Buyer's Account.

### 5. ASSIGNMENT

Neither Buyer nor Seller shall assign this Agreement nor delegate any of its duties hereunder without the prior written consent of the other Party, which consent shall not be unreasonably withheld, delayed or conditioned; provided, however, that either Party, without the consent of the other Party but with reasonable prior notice to the other Party, may assign this Agreement to any of its affiliates provided that such assignee's creditworthiness shall be, in the reasonable judgment of the non-assigning Party, equal to or greater than that of the assignor and, prior to the effective date of the assignment, the assignee has agreed in writing to unconditionally and fully assume the rights and obligations of the assignor under this Agreement. Any assignment in violation of this Section 4 shall be voidable at the sole discretion of the non-assigning Party.

### 6. FORCE MAJEURE

If either Party is rendered unable, wholly or in part, by Force Majeure to carry out its obligations with respect to this Agreement, then upon such Party giving notice and full particulars of such Force Majeure as soon as reasonably possible after the occurrence of the cause relied upon, such notice to be confirmed in writing to the other Party, the obligations of the claiming Party will, to the extent they are affected by such Force Majeure, be suspended during the continuance of said inability, but for no longer period, and the claiming Party will not be liable to the other Party for, or on account of, any loss, damage, injury or expense resulting from, or arising out of such event of Force Majeure. The Party receiving such notice of Force Majeure will have until the end of the tenth (10th) Business Day following such receipt to notify the claiming Party that it objects to or disputes the existence of an event of Force Majeure.

### 7. CHANGE IN LAW

If any Applicable Law, including Applicable Emissions Law, or Registry / Tracking System Protocols or procedures are enacted, amended, granted or revoked which have the effect of changing the transfer and sale procedure set forth in this Agreement so that the implementation of this Agreement becomes impossible or impracticable, the Parties hereto agree to negotiate in good faith to amend this Agreement to conform with such new, amended, or revoked statutes, rules, regulations, protocols or procedures, in order to maintain the original commercial intent of the Parties under this Agreement.

### 8. EVENTS OF DEFAULT

For purposes of this Agreement, a Party shall be in default (each of the following, an "Event of Default"):

- (a) if that Party materially breaches any or all of its obligations as described in this Agreement and such breach is not cured within three (3) Business Days of written notice of such breach from the other Party;
- (b) if any representation or warranty made by a Party in Section 2 of this Agreement proves to have been misleading or false in any material respect when made and such Party does not cure the underlying facts so as to make such representation and warranty correct and not misleading within ten (10) Business Days of written notice from the other Party; or
- (c) if that Party fails to provide Performance Assurance required pursuant to Section 3; or
- (d) if a Party:
  - (i) makes an assignment or any general arrangement for the benefit of its creditors,
  - (ii) files a petition or otherwise commences, authorizes or acquiesces in the commencement of a proceeding or cause under any bankruptcy or similar law for the protection of creditors, or has such a petition filed against it, or
  - (iii) otherwise becomes bankrupt or insolvent (however evidenced).

### 9. REMEDIES UPON DEFAULT

9.1 Remedies. If an Event of Default exists with respect to either Party as set forth in Section 8 at any time during the Term, the non-defaulting Party may select any or all of the following remedies: (i) upon ten (10) Business Days' written notice to the defaulting Party terminate this Agreement, provided that



termination is not an available remedy upon the first failure of Seller to Deliver or the first failure of Buyer to accept Delivery; (ii) withhold any payments due in respect of this Agreement and any other agreements between the Parties to the extent of its damages pursuant to this Section 9.2 (iii) exercise such remedies as provided in this Agreement, including an action for damages (except as limited by Section 9.7); and (iv) upon any failure of Seller to Deliver or any failure of Buyer to accept Delivery, the remedies provided for in Section 9.4.

9.2 Termination By Seller. If Buyer is in default and Seller elects to terminate this Agreement, then Buyer shall pay Seller, within five (5) Business Days of invoice receipt, an amount equal to the sum of (i) the Contract Price for any Product Delivered to Buyer for which Seller has not been paid, and (ii) the positive difference, if any, obtained by subtracting the Sales Price from the Unit Price for such Product multiplied by the amount of Product not received, plus reasonable third party fees (including broker fees) and legal costs incurred by Seller in enforcement and protection of its rights under this Agreement.

9.3 Termination By Buyer. If Seller is in default and Buyer elects to terminate this Agreement, then Seller shall be obligated to pay Buyer, within five (5) Business Days of invoice receipt, an amount equal to the positive difference, if any, obtained by subtracting the Unit Price from the Replacement Price for such Product multiplied by the amount of Product not Delivered, plus reasonable third party fees (including broker fees) and legal costs incurred by Buyer in enforcement and protection of its rights under this Agreement.

#### 9.4 Remedies for Failure to Deliver or Accept.

(a) Remedy for Failure to Deliver. Unless excused under the terms of this Agreement, if Seller fails to Deliver any of the Product to be Delivered under this Agreement by the Delivery Date in any year, Seller shall be obligated to pay to Buyer within five (5) Business Days of invoice receipt an amount equal to the positive difference, if any, obtained by subtracting the Contract Price for from the Replacement Price for such Product multiplied by the amount of Product not Delivered, plus reasonable third party fees (including broker fees) and legal costs incurred by Buyer in enforcement and protection of its rights under this Agreement.

(b) Remedy for Failure to Accept. Unless excused under the terms of this Agreement, if Buyer fails to accept Delivery of all or any part of the Product to be Delivered under this Agreement by the Delivery Date in any year, Buyer shall be obligated to pay to Seller within five (5) Business Days of invoice receipt an amount equal to the positive difference, if any, obtained by subtracting the Sales Price from the Contract Price for such Product multiplied by the amount of Product not accepted, plus reasonable third party fees (including broker fees) and legal costs incurred by Seller in enforcement and protection of its rights under this Agreement.

9.5 Interest. All overdue payments hereunder shall bear interest from (and including) the due date to (but excluding) the date of payment at the Interest Rate.

9.6 No Penalty. Both Parties hereby stipulate that: (i) the payment obligations set forth in this Section 8 are reasonable in light of the anticipated harm and the difficulty of estimation or calculation of actual damages, and each Party hereby waives the right to contest such payments as an unreasonable penalty; and (ii) the Non-Defaulting Party shall not be obligated to actually enter third-party replacement transactions to sell or purchase any applicable undelivered CCAs in connection with the Non-Defaulting Party's calculation of the Settlement Amount.

9.7 Exclusive Remedy. THE REMEDIES SET FORTH IN THIS ARTICLE 9 ARE THE SOLE AND EXCLUSIVE REMEDIES IN THE EVENT OF A DEFAULT OF A PARTY'S OBLIGATIONS TO SELL OR PURCHASE PRODUCT, AND A PARTY'S LIABILITY SHALL BE LIMITED AS SET FORTH IN THIS ARTICLE. ALL OTHER REMEDIES OR DAMAGES FOR FAILURE TO SELL OR PURCHASE PRODUCT AT LAW ARE HEREBY WAIVED.

9.8 Limitation of Liability. THE PARTIES CONFIRM THAT THE EXPRESS REMEDIES AND MEASURES OF DAMAGES PROVIDED IN THIS ANNEX SATISFY THE ESSENTIAL PURPOSES HEREOF. FOR BREACH OF ANY PROVISION FOR WHICH AN EXPRESS REMEDY OR MEASURE OF DAMAGES IS PROVIDED, SUCH EXPRESS REMEDY OR MEASURE OF DAMAGES SHALL BE THE SOLE AND EXCLUSIVE REMEDY, THE OBLIGOR'S LIABILITY SHALL BE LIMITED AS SET FORTH IN SUCH PROVISION AND ALL OTHER REMEDIES OR DAMAGES AT LAW OR IN EQUITY ARE WAIVED. WITHOUT LIMITING THE APPLICATION OF ARTICLES 9.2, 9.3 AND 9.4 IN THE EVENT OF A DEFAULT, THE DEFAULTING PARTY'S LIABILITY SHALL BE LIMITED TO DIRECT, ACTUAL DAMAGES ONLY, AND SUCH DIRECT, ACTUAL DAMAGES SHALL BE THE SOLE AND EXCLUSIVE REMEDY HEREUNDER. IN NO EVENT SHALL ANY OTHER LIABILITY BE INCURRED BY EITHER PARTY FOR ANY OBLIGATIONS WHICH ARISE UNDER THIS AGREEMENT, INCLUDING (BUT NOT LIMITED TO) CONSEQUENTIAL, INCIDENTAL, PUNITIVE, EXEMPLARY, OR INDIRECT DAMAGES IN TORT, CONTRACT, OR OTHERWISE. IT IS THE INTENT OF THE PARTIES THAT THE LIMITATIONS HEREIN IMPOSED ON REMEDIES AND THE MEASURE OF DAMAGES BE WITHOUT REGARD TO THE CAUSE OR CAUSES RELATED THERETO, INCLUDING THE NEGLIGENCE OF ANY PARTY, WHETHER SUCH NEGLIGENCE BE SOLE, JOINT OR CURRENT, OR ACTIVE OR PASSIVE. TO THE EXTENT ANY DAMAGES REQUIRED TO BE PAID HEREUNDER ARE LIQUIDATED, THE PARTIES ACKNOWLEDGE AND AGREE THAT THE DAMAGES ARE DIFFICULT OR IMPOSSIBLE TO DETERMINE, OR OTHERWISE OBTAINING AN ADEQUATE REMEDY IS INCONVENIENT, AND THE DAMAGES CALCULATED HEREUNDER CONSTITUTE A REASONABLE APPROXIMATION OF THE ACTUAL HARM OR LOSS. NOTHING IN THE FOREGOING SHALL BE CONSTRUED TO LIMIT ANY LEGAL, EQUITABLE, OR STATUTORY RIGHTS OF SETOFF OR ANY RIGHTS UNDER ANY PERFORMANCE ASSURANCE, OR TO PROHIBIT ANY ACTION TO ENFORCE ANY REMEDY PROVIDED UNDER THIS AGREEMENT.

## 10. CONFIDENTIALITY

10.1 Confidentiality. Except as provided in this Section, neither Party shall publish, disclose, or otherwise divulge Confidential Information to any person or third party at any time during or after the Term, without the other Party's prior express written consent. Each Party shall permit knowledge of and access to Confidential Information only to those of its affiliates and to persons investing in, providing funding to or acquiring it or its affiliates, and to its and the foregoing persons' respective attorneys, accountants, representatives, agents and employees who have a need to know such Confidential Information related to this Agreement and who have agreed to keep such Confidential Information confidential.

10.2 Disclosure. If required by any law, statute, ordinance, decision, order or regulation passed, adopted, issued or promulgated by a court, governmental agency or authority having jurisdiction over a Party, that Party may release Confidential Information, or a portion thereof, to the court, governmental agency or authority, as required by the applicable law, statute, ordinance, decision, order or regulation, and a Party may disclose Confidential Information to accountants in connection with audits, provided that such Party has (to the extent legally permissible and time permits) notified the other Party of the required disclosure, such that the other Party may attempt (if such Party so chooses) to cause that court, governmental agency, authority or accountant to treat such



information in a confidential manner and to prevent such information from being disclosed or otherwise becoming part of the public domain, and a Party may release Confidential Information to the extent required to determine the Market Price of any Product.

10.3 Tax Treatment Exception. Notwithstanding any provision of this Agreement to the contrary, the legal obligations of confidentiality hereunder do not extend to the U.S. federal or state tax structure or the U.S. federal or state tax treatment of any transaction hereunder. If any U.S. federal or state tax analyses or materials are provided to a Party, such Party is free to disclose any such analyses or materials without limitation.

10.4 Each Party agrees that violation of the terms of the Confidentiality provisions herein constitutes irreparable harm to the other Party, that a monetary remedy for a breach of such provisions will be inadequate, and that the harmed Party may seek any and all remedies available at law or in equity, including injunctive relief, provided that any damages shall be subject to the limitations set forth in this Agreement. In the event of any such breach by a Party, in addition to any other available rights and remedies, the other Party shall be entitled to temporary and permanent injunctive relief, including temporary restraining orders, preliminary injunctions, and permanent injunctions, without the necessity of posting a bond or making any undertaking in connection therewith, and without the necessity of proving actual damages. Each Party hereby waives any such requirement of a bond or undertaking, and acknowledges that in the absence of such a waiver, a bond or undertaking might be required by the court.

10.5 Survival. The Parties obligations under this Section 10 shall survive for a period of two (2) years following the expiration or termination of this Agreement.

#### 11. ENTIRE AGREEMENT

This Agreement, together with any attachments or exhibits specifically referenced herein, constitutes the entire agreement between the Seller and the Buyer with respect to the subject matter hereof, supersedes all prior oral or written representations and contracts, and may be modified only by a written amendment signed by Buyer and Seller.

#### 12. GOVERNING LAW; WAIVER OF TRIAL BY JURY

This Agreement shall be construed, enforced, and performed in accordance with the laws of the New York without recourse to principles governing conflicts of law. AS A MATERIAL INDUCEMENT TO EACH PARTY TO ENTER INTO THIS AGREEMENT, THE PARTIES EACH HEREBY IRREVOCABLY WAIVE ALL RIGHT TO TRIAL BY JURY IN ANY ACTION, PROCEEDING OR COUNTERCLAIM ARISING OUT OF OR RELATING HERETO, ANY PRODUCT OR THE TRANSACTIONS CONTEMPLATED HEREBY. EACH PARTY FURTHER WAIVES ANY RIGHT TO CONSOLIDATE ANY ACTION IN WHICH A JURY TRIAL HAS BEEN WAIVED WITH ANY OTHER ACTION IN WHICH A JURY TRIAL CANNOT BE OR HAS NOT BEEN WAIVED.

#### 13. RECORDING

Each Party consents to the recording of its trading, marketing and scheduling representatives' telephone conversations without any further notice. Any tape recordings may be submitted in evidence to any court or in any legal proceeding for the purpose of establishing any matter relating to the Transaction. In addition, the Parties agree not to contest the authority of either Party's employees to enter into the Transaction evidenced by this Agreement. Notwithstanding the foregoing, any agreement with respect to the Transaction shall be in a writing signed by both Parties.

#### 14. INDEMNITIES

Each party (an "Indemnifying Party") will indemnify and save harmless the other party (an "Indemnified Party") from any cause of action, loss, cost or damage that the Indemnified Party may incur, directly or indirectly, as a result of and to the extent caused by a breach of this Agreement by the Indemnifying Party.

#### 15. WAIVER

No delay or omission by a Party in the exercise of any right under this Agreement shall be taken, construed or considered as a waiver or relinquishment thereof, and any such right may be exercised from time to time and as often as may be deemed expedient. If any of the terms and conditions hereof are breached and thereafter waived by a Party, such waiver shall be limited to the particular breach so waived and is not deemed to waive any other breach hereunder.

#### 16. NOTICES

All notices, payments and other formal communications which either Party may give to the other under or in connection with this Agreement shall be in writing and shall be sent by any of the following methods: hand delivery; reputable overnight courier; certified mail, return receipt requested; or, with respect to communications other than payments, by facsimile transmission, if the original communication is delivered by reputable overnight courier. The communications shall be sent to the following addresses, and shall be effective when received:



**If to Counterparty:**  
City of San Jose California

**If to Vitol:**  
Vitol Inc  
1100 Louisiana St Suite 5500  
Houston TX 77002  
Attn Chris Schaffer  
[crs@vitol.com](mailto:crs@vitol.com)  
713-230-1000  
713-230-1300 (fax)

**Seller's Banking Information**  
As per invoice

**Confirmations:**  
Attn: Contract Administration  
[xcontractshou@vitol.com](mailto:xcontractshou@vitol.com)  
Fax: 713.230.1300

Either Party may change such address of facsimile number by written notice to the other Party.

**17. COUNTERPARTS**

This Agreement may be executed in any number of counterparts, each of which shall be an original, but which together shall constitute one and the same instrument. This Agreement may be delivered by facsimile or email. Any facsimile or email signatures shall have the same legal effect as manual signatures.